CHAPTER XXI.

MINERAL INDUSTRY.

§ 1. The Mineral Wealth of Australia.

1. **Place of Mining in Australian Development.**—The value of production from the mineral industry is now considerably less than that returned by the agricultural or the pastoral industry, nevertheless it was the discovery of gold in payable quantities that first attracted population to Australia, and thus laid the foundation of its nationhood. Prior to 1851, the year when Hargraves' memorable discovery was made, coal and copper had both been mined to some extent, and the existence of deposits of other minerals, including gold, had been proved. But it was the news of the sensational finds of the precious metal in 1851 and the year immediately following that brought about a constant stream of immigration, and caused an increase in population from 405,000 at the end of 1850 to upwards of 1,146,000 at the end of 1860.

2. **Extent of Mineral Wealth.**—The extent of the total mineral wealth of Australia cannot yet be regarded as completely ascertained, as large areas of country still await systematic prospecting. The presence of considerable deposits of valuable minerals has long been known. Thus, coal was discovered in 1797, and a shipload was exported to Bengal in 1799; silver was discovered as early as 1839, and was worked as early as 1864; copper mining dates back to 1844; lead to about 1848; iron to about 1850; while the discovery of gold in payable quantities dates back to 1851. Cobalt, nickel, manganese, chromium, tungsten, molybdenum, mercury, antimony, bismuth, zinc, cadmium, radio-active ores, etc., have all been found, some in fairly large quantities. During recent years osmiridium has figured largely in the Tasmanian returns.

Among the more valuable non-metalliferous substances other than coal may be mentioned coke, kerosene shale, graphite, alunite, asbestos, diatomaceous earth, phosphate, clays, ochres, etc.; in building stones—sandstones, syenites, granites, basalts, augite-andesite, porphyries, serpentines, slates, limestones, and marbles; in precious stones—diamonds, emeralds, rubies, sapphires, amethysts, precious opal, turquoise, topazes, garnets, chrysolites, cairngorm, agates, etc.

3. **Quantity and Value of Production during 1927.**—The quantities (where available) and the values of the principal minerals produced in each State, and in Australia as a whole during the year 1927, are given in the tables immediately following. It must be clearly understood that the figures quoted in these tables refer to the quantities and values of the various minerals in the form in which they were reported to the States Mines Departments, and represent amounts which the Mines Departments consider may fairly be taken as accruing to the mineral industry as such. They are not to be regarded as representative of Australia's potentiality as a producer of *metals*, this matter being dealt with separately in § 18 hereinafter. It may be explained, therefore, that the item pig-iron in New South Wales refers only to metal produced from locally-raised ore and so reported to the Mines Department. New South Wales is, of course, in normal times, a large producer of iron and steel from ironstone mined in South Australia. As the table shows, the latter State receives credit for this ironstone in its mineral returns, but the iron and steel produced therefrom cannot be assigned to the mineral industry of New South Wales. Similarly lead, silver-lead, and zinc are credited in the form reported to the State of origin—chiefly New South Wales—although the actual metal extraction is carried out to a large extent elsewhere.

MINERAL PRODUCTION.—QUANTITIES, 1927.

Minerals.	Unit.	N.S.W.	Vic.	Q'land.	S. Aust.	W. Aust.	Tas.	N.T. (d)	Australia.
Alunite	ton	..	..	3	..	..	..	..	3
Antimony	,,	63	..	..	..	..	..	..	63
Arsenic	,,	151	..	70	..	(c)	..	..	221
Asbestos	,,	..	..	..	..	11	..	..	11
Barytes	,,	200	..	..	1,886	..	..	..	2,086
Bismuth	cwt.	15	..	..	..	..	..	..	15
Brown Coal	ton	..	1,455,482	..	..	..	..	..	1,455,482
Coal	,,	11,126,114	684,245	1,099,040	..	501,505	112,056	..	13,522,960
Copper (ingot, matte, etc.)	,,	186	..	3,741	202	..	5,811	..	9,940
Copper ore	,,	190	..	..	..	2	..	..	192
Diatomaceous earth	,,	1,210	..	..	..	..	..	..	1,210
Gold	fine oz.	18,032	38,538	37,979	418	408,353	4,861	110	508,291
Gypsum	ton	1,482	20,835	..	93,850	6,675	..	..	122,842
Iron (pig) (b)	,,	118,951	..	..	..	..	..	..	118,951
Iron oxide	,,	5,011	..	..	..	..	..	..	5,011
Ironstone	,,	..	..	506	722,425	..	..	..	722,931
Kaolin	,,	11,319	2,473	..	150	..	..	..	13,942
Lead	,,	..	..	914	5	..	5,583	..	6,502
Lead and silver-lead ore, concentrates, etc.	,,	290,259	6	..	..	1,413	..	31	291,709
Limestone flux	,,	119,094	..	84,961	121,272	..	169,522	..	494,849
Magnesite	,,	10,017	72	..	330	..	..	..	10,419
Manganese ore	,,	1,202	15	241	..	30	..	..	1,488
Molybdenite	cwt.	..	..	20	..	..	..	..	20
Osmiridium	oz.	..	..	..	..	..	633	..	633
Phosphate	ton	130	..	..	749	..	..	..	879
Pigments	,,	274	114	..	21	..	..	..	409
Platinum	oz.	226	..	..	..	..	..	..	226
Salt	,,	..	(a)	..	79,286	..	..	..	79,286
Sapphires	,,	3,118	..	Not stated	..	..	..	..	3,118
Shale (oil)	ton	..	..	..	..	..	3,150	..	3,150
Silver	fine oz.	5,341	1,471	84,118	179	49,895	741,782	..	882,786
Tin and tin ore	ton	1,030	62	1,112	..	77	1,106	119	3,506
Wolfram	,,	..	..	115	..	..	149	..	264
Zinc and concentrates	,,	277,425	..	..	..	..	6,326	..	283,751

(a) Not available for publication. (b) See letterpress preceding this table. (c) Quantity not stated: Contained in gold ore. (d) Year ended 30th June.

The values of the minerals raised in each State during 1927 are given in the following table:—

MINERAL PRODUCTION.—VALUE, 1927.

Minerals.	N.S.W.	Victoria.	Q'land.	S. Aust.	W.Aust.	Tas.	N.T. (e)	Australia.
	£	£	£	£	£	£	£	£
Alunite	..	..	38	..	..	..	..	38
Antimony	5,040	..	..	..	..	..	..	5,040
Arsenic	1,679	..	350	..	819	..	..	2,848
Asbestos	..	..	..	..	304	..	..	304
Barytes	400	..	..	5,658	..	..	..	6,058
Bismuth	204	..	..	..	..	..	..	204
Brown Coal	..	220,003	..	..	..	..	..	220,003
Coal	9,782,002	762,530	987,465	..	407,967	99,802	..	12,039,766
Copper (ingot and matte)	11,290	..	218,842	12,452	..	362,988	..	605,572
Copper ore	1,365	..	..	..	101	..	..	1,466
Diamonds	227	..	..	..	..	..	..	227
Diatomaceous earth	3,632	..	..	..	..	..	..	3,632
Gold	76,595	163,699	161,321	1,776	1,734,571	20,646	468	2,159,076
Gypsum	2,038	11,388	..	82,119	9,818	..	..	105,363
Iron (pig) (b)	654,230	..	..	..	..	..	..	654,230
Iron Oxide	3,116	..	..	..	..	..	..	3,116
Ironstone	..	..	506	830,789	..	..	..	831,295
Kaolin	13,312	3,334	..	675	..	..	..	17,321
Lead	..	..	22,289	123	..	135,403	..	157,815
Lead and silver-lead ore, concentrates, etc.	3,487,446	132	..	..	24,592	..	379	3,512,549

For notes see next page.

MINERAL PRODUCTION—VALUE, 1927—*continued.*

Minerals.	N.S.W.	Victoria.	Q'land.	S. Aust.	W. Aust.	Tas.	N.T. (e)	Australia.
	£	£	£	£	£	£	£	£
Limestone flux ..	44,660	..	42,876	45,477	..	59,333	..	192,346
Magnesite ..	16,141	237	..	825	..	..	..	17,203
Manganese ore ..	4,285	60	362	..	303	..	..	5,010
Molybdenite ..	..	..	205	..	..	..	..	205
Opal	13,353	..	400	9,157	..	..	..	22,910
Osmiridium ..	..	..	..	..	..	7,456	..	7,456
Phosphate ..	258	..	..	1,124	..	..	..	1,382
Pigments ..	507	1,069	..	288	..	..	..	1,864
Platinum ..	3,200	..	..	..	..	..	..	3,200
Salt	..	(a)	..	178,394	..	..	..	178,394
Sapphires ..	2,612	..	2,202	..	..	..	..	4,814
Shale (oil) ..	..	..	..	..	..	2,050	..	2,050
Silver	534	172	9,813	20	5,829	87,024	..	103,392
Tin and tin ore ..	287,539	11,454	193,774	..	13,316	317,593	18,754	842,430
Wolfram ..	..	..	128	..	..	9,886	..	10,014
Zinc & concentrates	996,877	..	..	..	..	181,242	..	1,178,119
Unenumerated ..	(d) 37,160	2,300	4,540	19,645	4,817	(f) 17,889	8	86,359
Total ..	15,449,702	1,176,378	1,645,111	1,188,522	2,202,437	1,301,312	19,609	22,983,071

(a) Not available for publication. (b) See letterpress, page 755. (c) Mica. (d) Includes dolomite £13,633, silica £8,987, and fireclay £12,935. (e) Year ended 30th June. (f) Includes nickel £14,656.

It may be pointed out in connexion with the figures given in the above table that the totals are exclusive of returns relating to certain commodities, such as stone for building and industrial uses, sand, gravel, brick and pottery clays, lime, cement, and slates, which might rightly be included under the generic term "mineral." Valuations of the production of some of these may be obtained from the reports of the various Mines Departments, but in regard to others it is impossible to obtain adequate information. In certain instances, moreover, the published information is of little value. By restricting the comparison to items in connexion with which properly comparable information can be obtained for each State, it is believed that a satisfactory estimate of the progress of the mineral industry can be more readily obtained. The items excluded from the total for New South Wales in 1927 consist of—lime, £115,191; building stone, £113,717; Portland cement, £1,761,210; coke, £1,131,335; road materials, £292,007; shell grit, £1,430; mineral water, £180; sulphur and sulphuric acid, £64,611; and brick and pottery clays, £391,026. From the Queensland returns, marble, £880, has been deducted, while carbide, £34,896, and cement, £176,779, have been excluded from the Tasmanian figures.

4. **Value of Production, 1923 to 1927.**—The value of the mineral production in each State during the five years 1923 to 1927 is given in the table hereunder:—

MINERAL PRODUCTION.—VALUE, 1923 TO 1927.

Year.	N.S.W.	Victoria.	Q'land.	S. Aust.	W. Aust.	Tas.	N.T.	Australia.
	£	£	£	£	£	£	£	£
1923 ..	14,176,688	1,031,223	2,215,498	890,378	2,747,101	1,154,397	16,612	22,231,897
1924 ..	16,299,835	964,917	2,305,669	953,592	2,776,796	1,325,967	19,138	24,645,914
1925 ..	16,657,585	1,000,763	2,012,456	1,028,396	2,393,890	1,477,944	21,715	24,592,749
1926 ..	16,319,265	1,082,006	1,608,661	1,032,353	2,371,864	1,573,997	19,085	24,007,231
1927 ..	15,449,702	1,176,378	1,645,111	1,188,522	2,202,437	1,301,312	19,609	22,983,071

For New South Wales the value of production in 1927 was about £1,208,000 lower than that for 1925, which was the highest ever recorded. The falling-off in 1927 was largely due to the decreased returns from silver-lead and zinc ores and concentrates, and from copper, tin, gold, and platinum, which were offset to some extent by increases in iron and coal.

The increase in the Victorian returns for 1927 was chiefly due to improved figures for coal, the value of black coal showing a yield of £105,000 in excess of that for 1926, while the value of brown coal produced rose by £31,000. For 1927 the value of brown coal was over £220,000, as compared with £41,000 in 1924.

In Queensland the falling-off in production in 1926 and 1927 was due to lessened returns from gold, copper, silver, and lead. Gold showed an improvement in 1927 as compared with 1926, but there was practically a universal decline in other minerals. The Mines Department, however, states that obsolete plant and methods of treatment are responsible for a large proportion of the reduced output. Some of the mining companies have recognized this, and are introducing improvements which it is believed will result in enhanced returns from such metals as copper and tin. The improvement in the returns for South Australia during the last five years was due chiefly to increased production from ironstone, the value of which rose from £445,000 in 1923 to £831,000 in 1927, while the yield from salt rose from £113,000 to £178,000 and from gypsum from £47,000 to £82,000. In Western Australia the returns for 1927 show a decrease of over £169,000 on the total for 1926, the fall being due to the decline in the returns from gold and silver lead, although the figures for coal showed a good increase. The decline in the value of production for Tasmania in 1927 was due partly to the low prices realized for industrial metals and partly to labour troubles. Returns from lead dropped by £48,000, copper showed a decrease of nearly £92,000, silver £53,000, while the low price of osmiridium was responsible for a drop from £62,000 in 1926 to a little over £7,000 in 1927. It is stated that the decline in the Northern Territory returns for 1926 and 1927 as compared with 1925 was due in some measure to the fact that some of those engaged in mining forsook it to take up more profitable work in other pursuits. The number of Chinese miners in the Territory has been steadily decreasing during recent years.

5. **Total Production to end of 1927.**—In the next table will be found the estimated value of the total mineral production in each State up to the end of 1927. The figures given in the table are also exclusive of the same items referred to in connexion with the preceding table. Thus the total for New South Wales falls short by £29,355,000 of that published by the State Department of Mines, the principal items excluded being coke, £12,146,000; cement, £13,849,000; lime, £1,361,000; and considerable values for marble slate, granite, chert, gravels, etc., which the Department now includes in the returns for quarries.

MINERAL PRODUCTION.—VALUE TO END OF 1927.

Minerals.	N.S.W.	Victoria.	Q'land.	S. Aust.	W. Aust.	Tas.	Nor. Ter. (a)	Australia.
	£	£	£	£	£	£	£	Million. £
Gold ..	63,781,405	303,240,584	85,792,465	1,630,003	160,251,985	8,929,366	2,282,731	626
Silver and lead ..	112,390,348	264,630	4,161,698	381,394	2,246,106	8,483,537	63,958	128
Copper ..	15,552,954	216,656	25,985,957	33,104,333	1,805,183	18,587,355	232,852	95
Iron ..	7,399,198	15,641	472,785	6,235,636	36,721	52,110	..	14
Tin ..	13,965,677	960,163	10,820,523	..	1,561,232	16,781,006	603,394	45
Wolfram	272,187	11,885	1,061,800	301	1,441	212,061	216,859	2
Zinc ..	20,971,618	..	13,460	15,993	5,437	602,100	..	21
Coal ..	170,172,430	10,263,192	16,328,579	..	5,360,703	1,534,714	..	204
Other ..	7,715,984	848,172	2,883,173	3,880,860	177,621	1,465,272	40,634	17
Total ..	412,221,801	315,820,923	147,520,440	45,248,520	171,446,429	56,647,521	3,440,428	1,152

(a) To 30th June, 1927.

The "other" minerals in New South Wales include alunite, £209,000; antimony, £351,000; bismuth, £233,000; chrome, £121,000; diamonds, £145,000; limestone flux, £1,146,000; molybdenite, £212,000; opal, £1,575,000; scheelite, £192,000; and oil shale £2,691,000. In the Victorian returns antimony ore was responsible for £612,000. The value for coal in this State includes £873,000 for brown coal. Included in "other" in the Queensland production were opal, £183,000; gems, £613,000; bismuth, £118,000; cobalt, £148,000; molybdenite, £599,000; and limestone flux, £858,000. The chief items in South Australian "other" minerals were salt, £2,309,000; limestone flux, £464,000; gypsum, £544,000, and phosphate, £606,000. In the Tasmanian returns limestone flux was responsible for £606,000, osmiridium for £482,000, scheelite for £112,000, and iron pyrites for £94,000.

6. **Decline in the Metalliferous Industry.**—On the 1st December, 1921, a Select Committee was appointed by the Legislative Assembly of New South Wales to inquire into and report upon the serious decline in the metalliferous industry. The result of the Committee's investigations was published in a Report issued in 1922, wherein the chief contributing causes of the decline in New South Wales and in Australia generally were summarized as follows:—(1) High cost of production: (2) Deterioration in ore values in existing mines: (3) Inadequate machinery: (4) High freights: (5) High treatment charges: (6) Imperfect labour conditions in mines: (7) Lack of new payable discoveries: (8) Lack of efficiently-supported prospecting.

7. **Geophysical Methods for Detection of Ore Deposits.**—Recently considerable attention has been devoted to gravimetric, surface potential, inductive, or magnetic methods of locating ore bodies, and the Empire Marketing Board has provided a sum of £16,000 spread over two years, conditionally on the Commonwealth Government making available an equal amount for the purpose of undertaking test surveys. The Government Geologist of New South Wales, after a close study of the methods in use in other countries, whilst deprecating undue optimism, suggested the Hunter River Basin, the Broken Hill District, and the Greater Cobar District as suitable fields for the application of geophysical methods.

8. **Precious Metals Prospecting Act of 1926.**—Under the provisions of this Act a sum of £40,000 was allocated by the Commonwealth Government to assist persons or companies engaged in prospecting for precious metals. Of the total sum an amount of £15,000 was set aside for the Northern Territory, and the balance to the States in proportions to be determined by the Minister.

§ 2. Gold.

1. **Discovery in Various States.**—The discovery of gold in payable quantities was an epoch-making event in Australian history, for, as one writer aptly phrases it, this event "precipitated Australia into nationhood." A more or less detailed account of the finding of gold in the various States appears under this section in Official Year Books Nos. 1 to 4, but considerations of space preclude its repetition in the present issue.

2. **Production at Various Periods.**—In the following table will be found the value of the gold raised in the several States and in Australia as a whole during each of the six decennial periods from 1851 to 1920, and in single years from 1921 to 1927, from the dates when payable discoveries were first reported. Owing to defective information in the earlier years the figures fall considerably short of the actual totals, for during the first stages of mining development, large quantities of gold were taken out of Australia by successful diggers, who preferred to keep the amount of their wealth secret.

GOLD.—VALUE OF PRODUCTION, 1851 TO 1927.

Year.	N.S.W.	Victoria.	Q'land.	S. Aust.	W. Aust.	Tas.	Nor. Ter.	Australia.
	£	£	£	£	£	£	£	£
1851–60..	11,530,583	93,337,052	14,565	..	..	788,564	..	105,670,764
1861–70..	13,676,103	65,106,264	2,076,494	..	..	12,174	..	80,871,035
1871–80..	8,576,654	40,625,188	10,733,048	579,068	..	700,048	79,022	61,293,028
1881–90..	4,306,541	28,413,792	13,843,081	246,668	178,473	1,514,921	713,345	49,216,821
1891–1900	10,332,120	29,904,152	23,989,359	219,931	22,308,524	2,338,336	906,988	89,999,410
1901–10..	9,569,492	30,136,686	23,412,395	310,080	75,540,415	2,566,170	473,871	142,009,109
1911–20..	4,988,377	13,354,217	9,876,677	238,808	46,808,351	873,302	100,652	76,240,384
1921 ..	271,302	554,087	214,060	13,933	2,935,693	28,311	1,299	4,018,685
1922 ..	118,359	501,515	378,154	4,693	2,525,811	16,101	540	3,545,173
1923 ..	83,325	422,105	392,563	4,199	2,232,179	16,300	743	3,151,414
1924 ..	86,905	312,398	459,716	4,093	2,255,932	21,516	3,270	3,143,830
1925 ..	82,498	200,958	197,118	3,535	1,874,320	15,041	1,939	2,375,409
1926 ..	82,551	208,471	43,914	3,219	1,857,716	17,936	594	2,214,401
1927 ..	76,595	163,699	161,321	1,776	1,734,571	20,646	468	2,159,076
Total ..	63,781,405	303,240,584	85,792,465	1,630,003	160,251,985	8,929,366	2,282,731	625,908,539

The value of the gold yield in 1927 was the lowest recorded since the discovery of the precious metal in 1851.

The amount of gold raised in Australia in any one year attained its maximum in 1903, in which year Western Australia also reached its highest point. For the other States the years in which the greatest yields were obtained were as follows:—New South Wales, 1852; Victoria, 1856; Queensland, 1900; South Australia, 1904; and Tasmania, 1899.

The following table shows the quantity in fine ounces of gold raised in each State and in Australia during each of the last five years, the value of one ounce fine being taken at £4 8s. 5¾d. in 1923, at £4 13s. 0¼d. in 1924, and at £4 4s. 11 5/11d. for each of the last three years:—

GOLD.—QUANTITY PRODUCED, 1923 TO 1927.

Year.	N.S.W.	Victoria.	Q'land.	S. Aust.	W. Aust.	Tasmania.	Nor. Ter.	Australia.
	Fine ozs.	Fine ozs.	Fine ozs.	Fine ozs.	Fine ozs.	Fine ozs.	Fine ozs.	Fine ozs.
1923 ..	18,833	95,403	88,726	949	504,511	3,684	(a) 168	712,274
1924 ..	18,685	67,167	98,841	880	485,035	4,626	(a) 703	675,937
1925 ..	19,422	47,296	46,406	832	441,252	3,524	(a) 456	559,188
1926 ..	19,435	49,078	10,339	758	437,343	4,222	(a) 140	521,315
1927 ..	18,032	38,538	37,979	418	408,353	4,861	(a) 110	508,291

(a) Year ended 30th June.

Unfortunately, the general decline which has characterized Australia's gold output for a number of years has not been checked by new finds of importance, and unless more economic methods of exploiting existing low-grade deposits can be evolved the depression is likely to continue.

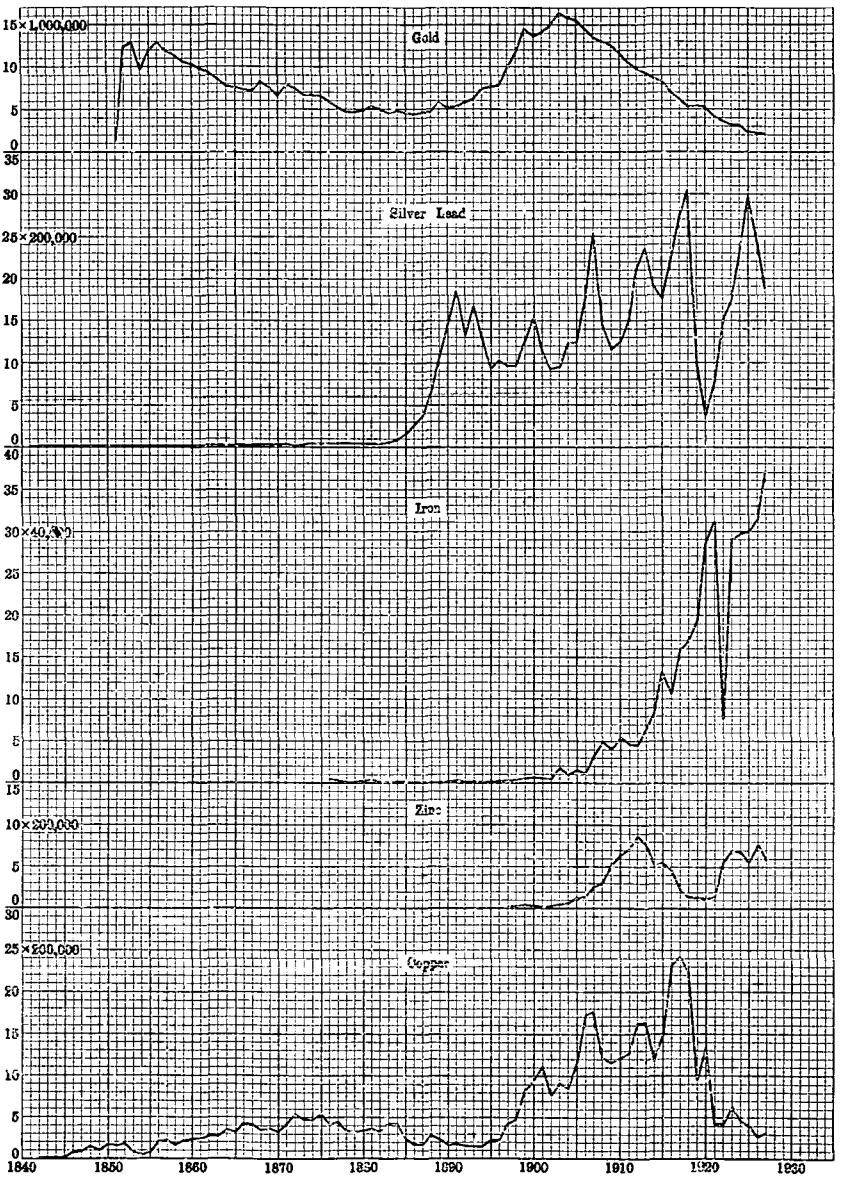
3. **Changes in Relative Positions of States as Gold Producers.**—A glance at the figures in the table showing the value of gold raised will sufficiently explain the enormous increase in the population of Victoria during the period 1851 to 1861, when an average of over 40,000 persons reached the State each year. With the exception of the year 1889, when its output was surpassed by that of Queensland, Victoria maintained its position as the chief gold-producer for a period of forty-seven years, or up to 1898, when its production was outstripped by that of Western Australia, the latter State from this year onward contributing practically half, and so far as recent years are concerned more than half the entire yield of Australia. New South Wales occupied the second place on the list until 1874, when Queensland returns exceeded those of the parent State, and, with the exception of the years 1921 and 1926, maintained this pre-eminence to the end of 1927. South Australia has occupied the position of lowest contributor to the total gold yield since the year 1871. Taking the average of the last ten years, the relative position of each State in regard to the gold production of Australia was as follows:—

GOLD.—RELATIVE POSITION OF STATES AS PRODUCERS, 1918 TO 1927.

State.	Annual Average of Gold Production, 1918 to 1927.	Percentage on Total.	State.	Annual Average of Gold Production, 1918 to 1927.	Percentage on Total.
	ozs.			ozs.	
Total	777,499	100.0	New South Wales	37,259	4.8
Western Australia..	559,689	72.0	Tasmania ..	5,415	0.7
Victoria	95,591	12.3	South Australia ..	1,857	0.2
Queensland ..	77,308	10.0	Northern Territory	380	..

4. **Methods of Gold Mining adopted in Each State.**—(i) *New South Wales.*—The largest share of the production in 1927 was obtained by dredges operating in the Tumut and Adelong and Lachlan divisions. The yields from alluvial other than by dredging

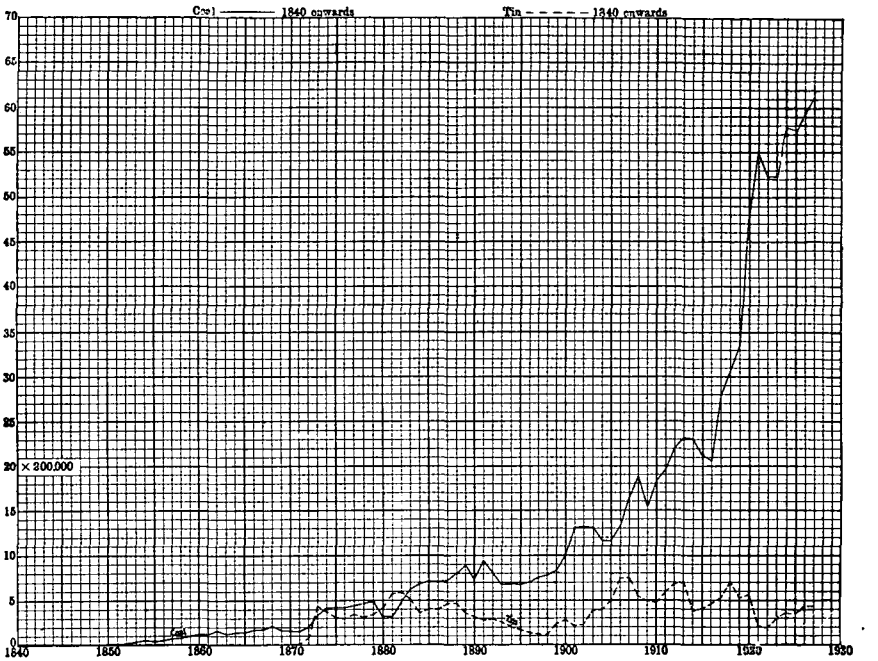
VALUES OF THE PRINCIPAL MINERALS PRODUCED—AUSTRALIA, 1840 TO 1927.

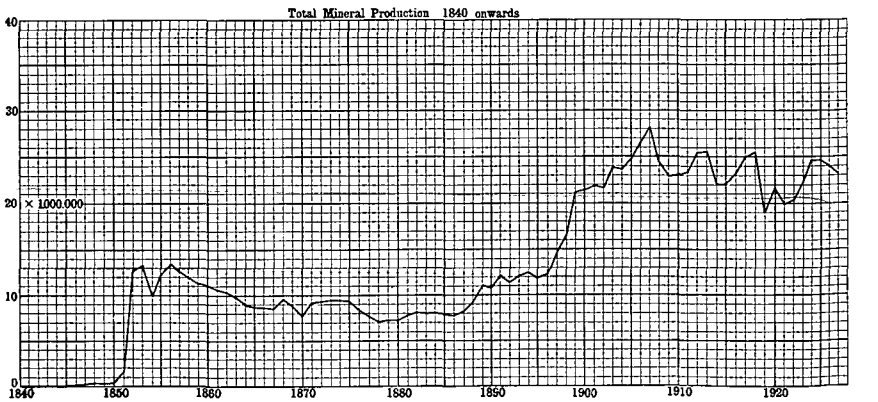


EXPLANATION.—The values shown are those of the total Australian production of certain of the most important minerals in successive years from 1840 onwards.

The base of each small square represents an interval of one year, and the vertical height represents in the case of gold £1,000,000; in the case of silver and lead, zinc and copper £200,000; and in the case of iron, £40,000.

VALUES OF PRINCIPAL MINERALS PRODUCED—AUSTRALIA, 1840 TO 1927—
continued.





EXPLANATION.—The values shown are those of the total Australian production of certain of the most important minerals in successive years from 1840 onwards.

The base of each small square represents an interval of one year, and the vertical height represents in the case of coal and tin £200,000, and in the case of total mineral production £1,000,000.

amounted to 1,086 ozs., of which 102 ozs. were won in the Tambaroora and Turon district, 107 ozs. at Peel and Uralla, 103 ozs. in the Southern area, 234 ozs. at Bathurst, and 250 ozs. in the Hunter and Macleay area. From stone treated the production was 5,520 ozs., about 3,200 ozs. of the total coming from the Albert district. The southern district contributed 864 ozs., Bathurst, 252 ozs.; Hunter and Macleay, 288 ozs.; Tambaroora and Turon, 252 ozs.; Clarence and Richmond, 222 ozs.; Lachlan, 184 ozs.; and Peel and Uralla, 103 ozs. From the Cobar district, which for many years was the principal producer, the yield in 1927 was only 60 ozs., as compared with over 3,000 ozs. in 1922.

(ii) *Victoria.* Reef mining predominates in Victoria, although gold is also obtained from alluvial workings, both surface and deep leads. Owing to the exhaustion of much of the payable auriferous area the yield has been on the down grade for many years, and the return for 1927 was the lowest experienced since 1851. A considerable amount of attention is given to dredging and hydraulic sluicing, particularly in the Beechworth, Maryborough, Castlemaine, Ararat, Stawell, Gippsland, and Ballarat districts. The yields from alluvial and quartz respectively as returned (in crude ounces) from the chief mining districts of the State during 1927 were as follows:—Ararat and Stawell, 94 and 63; Ballarat, 494 and 1,730; Beechworth, 4,568 and 9,292; Bendigo, 287 and 12,658; Castlemaine, 906 and 7,796; Gippsland, 245 and 2,990; and Maryborough, 198 and 499. The yield from the cyanide plants amounted to 1,672 ozs.

The largest output from quartz mining in the Bendigo district was furnished by the Hercules and Energetic, 5,303 ozs., £20,973, followed by the New Red, White, and Blue, 3,571 ozs., £14,286, and Ironbark, 483 ozs., £1,911. In the Beechworth district the Rose, Thistle, and Shamrock at Harrietville returned 3,800 ozs., £15,536; the Eldorado at Gaffney's Creek, 1,624 ozs., £6,251; and the Amalgamated at Harrietville, 918 ozs., £3,903. In the Daylesford area of the Castlemaine district the Ajax returned 1,365 ozs., £6,369. In the Tarrengower area of this district, the New Oswald returned 1,199 ozs., £4,692; and the Goldsbrough, 1,878 ozs., £7,513. In the Gippsland district the Loch Fyne Co. at Jericho produced 2,161 ozs., valued at £7,612; and the Golden Lily at Donnelly's Creek, 585 ozs., valued at £2,258. From the once famous Ballarat area the yield in 1927 was under £5,000.

From alluvial the principal yield was obtained by Cock's Pioneer Gold and Tin Mines, with 3,601 ozs., valued at £14,400. This company, which operates in the Beechworth district, also produced about £8,000 worth of tin during the year. The G.S.G. Amalgamated returned 424 ozs., valued at £1,720 in the same district.

(iii) *Queensland.* Operations in Queensland are chiefly confined to reefing and to the production of gold in connexion with the smelting of copper and other ores, the yield from alluvial in 1927 being only 1,433 ozs., of which 1,180 ozs. were obtained at Batavia River, while the quantity produced from stone treated was 5,477 ozs.; from copper and other ores 29,019 ozs.; and from old tailings 2,050 ozs.; making a total production of 37,979 ozs. The yields from the principal fields were—Ravenswood, 2,480 ozs.; Cloncurry, 1,359 ozs.; Mount Coolon, 3,391 ozs.; and Mount Morgan, 27,679 ozs. The yield at Mount Morgan was obtained almost entirely from the treatment of copper and other ores. The once famous Charters Towers field is apparently approaching exhaustion, the value of the production therefrom in 1927 being under £1,300.

(iv) *South Australia.* Gold is found in widely-scattered localities in South Australia, but the production has at no period been large. During the last five years the yield has declined from 950 ozs. in 1923 to 418 ozs. in 1927. Recently there has been a rush to peg out claims near a reported find about 20 miles from Mt. Bryan.

(v) *Western Australia.* A grouping of the auriferous deposits of Western Australia under various headings was given in previous issues (see Official Year Book 19, p. 725), but considerations of space preclude its retention in the present issue.

The yields from the principal fields in order of importance were as follows:—East Coolgardie, 299,256 ozs.; Mt. Margaret, 36,698 ozs.; Murchison, 27,886 ozs.; Yilgarn, 9,227 ozs.; Broad Arrow, 7,570 ozs.; East Murchison, 6,025 ozs.; Coolgardie, 5,786 ozs.; Dundas, 2,739 ozs.; North-East Coolgardie, 2,487 ozs.; Yalgoo, 2,394 ozs.; North Coolgardie, 2,055 ozs.; Pilbara, 2,023 ozs.; Peak Hill, 1,689 ozs.; Phillips River, 284 ozs.; and Kimberley, 194 ozs. Of the total yield of 406,470 ozs. reported to the Mines Department, 404,035 ozs. were obtained from ore treated, 1,221 ozs. from dollied and specimens, while the return from alluvial was about 1,200 ozs. The total referred

to differs somewhat from that quoted in the first table in this chapter, which represents gold exported and minted. It may be noted here that the total amount of dividends paid by Western Australian mining companies to the end of the year 1927 was £28,698,000.

Western Australia reached its zenith as a gold-producer in 1903, when the output was valued at £8,771,000, but since then there has been a more or less steady decline until in 1927 the total had dropped to £1,735,000. Three causes may be adduced to account for this falling-off—(1) Exhaustion of known rich deposits: (2) Unwise development, *i.e.*, "picking the eyes" of good mines: (3) Increased cost of stores, equipment, and labour, rendering it unprofitable to treat low-grade ores. During the year 1926 the Commonwealth Development and Migration Commission appointed a technical Committee to report on the best means of reviving the industry. This Committee made various recommendations in regard to the Kalgoorlie and Gwalia areas, and negotiations were in progress in 1927 between the Governments and the mining and financial interests concerned with a view to giving effect to these recommendations, but so far no definite results have been achieved. A geological expert was appointed to carry out special investigations, and this work is now proceeding.

(vi) *Tasmania.*—The yield in Tasmania in 1927 amounted to 4,861 ozs., an advance of about 600 ozs. on the total for 1926. The gold is obtained from copper and lead ores, from gold-bearing quartz veins, and from alluvial workings, the return from the last-mentioned being incomplete owing to lack of information from diggers. Blister copper produced by the Mt. Lyell Co. in 1927 contained 2,138 ozs.

(vii) *Northern Territory.* The production for 1927 amounted to only 110 ozs. fine. It is stated that the potentialities of the older fields have by no means been exhausted, although a revival of the industry depends on the expenditure of large sums of money, either by the Government or by mining speculators, on developmental work. The bulk of the production came from Fletcher's Gully, where there is a five-head battery owned by Chinese, and a small amount was won by prospectors and old Chinese fossickers.

5. **Remarkable Masses of Gold.**—Allusion has already been made in preceding Year Books to the discovery of "nuggets" and other remarkable masses of gold, but it is not proposed to repeat this information in the present issue. (See Year Book No. 4, page 500.)

6. **Modes of Occurrence of Gold in Australia.**—This subject has been alluded to at some length in earlier issues of the Year Book, but considerations of space will not permit of repetition in the present issue.

7. **Place of Australia in the World's Gold Production.**—In the table given below will be found the estimated value of the world's gold production, and the share of Australia therein during the five years 1923 to 1927. The figures given in the table have been compiled chiefly from returns obtained directly by the Commonwealth Bureau of Census and Statistics from the gold-producing countries of the world.

GOLD.—WORLD'S PRODUCTION, 1923 TO 1927.

Year.	World's Production of Gold.	Gold Produced in Australia.	Percentage of Australia on Total.
	£	£	%
1923	78,603,000	3,153,000	4.0
1924	89,225,000	3,142,000	3.5
1925	81,420,000	2,375,000	2.9
1926	82,470,000	2,214,000	2.7
1927	82,516,000	2,159,000	2.6

The value of the gold yield in the ten chief producing countries during each of the five years 1923 to 1927 is given in the table hereunder. Particulars of the quantity and value of the gold production for all countries for the ten years 1918–27 will be found in the Bulletin of Australian Production issued by this Bureau.

GOLD.—PRODUCTION, CHIEF COUNTRIES, 1923 TO 1927.

Country.	1923.	1924.	1925.	1926.	1927.
	£	£	£	£	£
Union of South Africa	40,479,000	44,534,000	40,768,000	42,285,000	42,198,000
United States ..	10,735,900	11,378,000	9,854,000	9,509,000	8,993,000
Canada	5,457,000	7,095,000	7,373,000	7,451,000	7,870,000
Russia	1,381,000	4,456,000	4,507,000	4,214,000	4,507,000
Mexico	3,437,000	3,686,000	3,351,000	3,282,000	3,081,000
Rhodesia	2,865,000	2,920,000	2,470,000	2,521,000	2,470,000
Australia	3,153,000	3,142,000	2,375,000	2,214,000	2,159,000
India	1,607,000	1,843,000	1,673,000	1,631,000	1,632,000
Japan	1,154,000	1,177,000	1,189,000	1,285,000	1,374,000
Gold Coast	882,800	957,700	844,000	847,600	728,800
Colombia	1,220,000	1,391,000	1,070,000	757,000	608,000

It has been deemed advisable to apportion values in accordance with Australian currency, *i.e.*, at £4 8s. 5¾d. for 1923, £4 13s. 0¼d. for 1924, and £4 4s. $11\frac{5}{11}$d. for each of the last three years.

The next table shows the average yearly value in order of importance of the yield in the chief gold-producing countries for the decennium 1918–1927.

GOLD.—AVERAGE ANNUAL PRODUCTION, CHIEF COUNTRIES, 1918 TO 1927.

Country.	Value.	Country.	Value.
	£		£
Union of South Africa ..	41,125,000	Russia	2,494,000
United States	11,585,000	India	1,936,000
Canada	5,728,000	Japan	1,279,000
Australia	**3,678,000**	Colombia	1,180,000
Mexico	3,546,000	Gold Coast	1,035,000
Rhodesia	2,823,000		

The comparison has been restricted to countries where the average for the period is in excess of a million sterling.

8. **Employment in Gold Mining.**—The number of persons engaged in gold mining in each State in 1901 and during each of the last five years is shown in the following table :—

GOLD MINING.—PERSONS EMPLOYED, 1901, AND 1923 TO 1927.

Year.	N.S.W.	Victoria.	Q'land.	S. Aust.	W. Aust.	Tas.	Nor. Ter.	Total.
	No.	No.	No.	No.	No.	No.	No.	No.
1901 ..	12,064	27,387	9,438	1,000	19,771	1,112	200	70,972
1923 ..	1,141	2,982	603	32	5,555	119	30	10,462
1924 ..	1,014	2,651	452	30	5,296	128	18	9,589
1925 ..	831	2,353	347	34	5,009	103	32	8,709
1926 ..	808	1,967	321	26	4,488	107	26	7,743
1927 ..	670	1,126	304	17	4,056	65	12	6,250

The heavy decline noticeable since 1901 is of course due to the exhaustion of accessible payable deposits and the failure to locate any considerable fresh sources of supply.

§ 3. Platinum and Platinoid Metals.

1. **Platinum.**—(i) *New South Wales.* The deposits at present worked in the State are situated at Platina in the Fifield division, near Parkes, and the production in 1927 amounted to 226 ozs., valued at £3,200, as compared with 397 ozs., valued at £6,910 in the preceding year, while the total production recorded to the end of 1927 amounted to 18,446 ozs., valued at £112,826. During the year 1927 prospecting operations were carried on for platinoid minerals in an area about 22 miles from Broken Hill.

(ii) *Victoria.* In Gippsland the metal has been found in association with copper, and 127 ozs. were produced in 1913, but there was no production in recent years.

(iii) *Queensland.* Platinum, associated with osmiridium, has been found in the beach sands between Southport and Currumbin, in creeks on the Russell goldfield near Innisfail, and in alluvial deposits on the Gympie gold-field, but no production has been recorded.

2. **Osmium, Iridium, etc.**—(i) *New South Wales.* Small quantities of osmium, iridium, and rhodium are found in various localities. Platinum, associated with iridium and osmium, has been found in the washings from the Aberfoil River, about 15 miles from Oban; on the beach sands of the northern coast; in the gem sand at Bingara, Mudgee, Bathurst, and other places. In some cases, as for example in the beach sands of Ballina, the osmiridium and other platinoid metals amount to as much as 40 per cent. of the platinum, or about 28 per cent. of the whole metallic content.

(ii) *Victoria.* In Victoria, iridosmine has been found near Foster, and at Waratah Range, South Gippsland.

(iii) *Tasmania.* For many years osmiridium has been known to exist in the bed of the Savage River, on the West Coast, and in rivulets and creeks in the serpentine country. The first recorded production was in 1910, when 120 ozs., valued at £530, or £4 8s. 4d. per oz., were raised. In 1914 the yield had increased to 1,019 ozs., valued at £10,076, or nearly £9 18s. per oz. From 1915 to 1917 the amount raised fell off considerably, owing to difficulty in disposing of the metal, but in 1918 there was an increase to 1,607 ozs., valued at £44,833; while in 1920 the 2,009 ozs. produced returned £77,114, or over £38 7s. 8d. per oz. In October of that year as much as £42 per oz. was obtained. For 1921 the production was 1,751 ozs., valued at £42,935, or about £24 10s. per oz. The output in 1925 was 3,366 ozs., valued at £103,570, or over £30 15s. per oz. Towards the middle of that year the discovery of rich alluvial wash on the Adams River, in the south-west of the State, led to a "rush," and within a few months over 1,000 men were on the field. As in the case with other fields in Tasmania, the osmiridium is shed from serpentine derived from bronzitite rocks, and the claims worked in 1925 were all alluvial. In 1926 the output was 3,173 ozs., valued at £61,908, the heavy decline as compared with 1925 being due to the slump in prices, which averaged £23 10s. in the first quarter, and dropped to £11 7s. in the last quarter of 1926. Production in 1927 fell to 633 ozs., valued at £7,456, the decrease being due to the low average price (£11 per oz.) realized for the alloy.

§ 4. Silver and Lead.

1. **Occurrence in Each State.**—Particulars regarding the occurrence of silver in each State will be found in preceding Year Books, Nos. I to 5, but considerations of space preclude the repetition of this matter in the present volume.

2. **Development of Silver Mining.**—The value of the production of silver, silver-lead and ore, and lead from each State during the five years ending 1927 is given hereunder :—

SILVER AND LEAD.—PRODUCTION, 1923 TO 1927.

Year	N.S.W.	Victoria.	Q'land.	S. Aust.	W. Aust.	Tas.	Nor. Ter.	Australia.
	£	£	£	£	£	£	£	£
1923 ..	2,956,862	963	216,645	60	60,061	218,881	..	3,453,472
1924 ..	4,310,360	645	167,469	373	96,504	252,718	..	4,828,069
1925 ..	5,320,976	291	240,684	1,655	114,961	302,961	(a) 617	5,982,145
1926 ..	4,399,953	307	147,724	865	85,604	281,155	(a) 447	4,916,055
1927 ..	3,487,980	304	32,102	143	30,421	222,427	(a) 379	3,773,756

(a) Year ended 30th June.

Production in New South Wales during 1924 was greatly stimulated by the favourable price of the metals, and with the exception of the Central mine, where work was restricted to fire-fighting, the chief mines on the Broken Hill lode were in full operation. Renewed activity resulted from the high prices of lead and zinc in 1925, when the Central mine rejoined the list of producers, the fire areas having been isolated by water curtains on the various levels as required. The decline in values recorded in 1926 and 1927 was due to falling prices of lead and spelter.

It must be understood that the totals for New South Wales in the above table represent the *net* value of the product (excluding zinc) of the silver-lead mines of the State. In

explanation of the values thus given, it may be noted that the metallic contents of the larger portion of the output from the silver-lead mines in the State are extracted outside New South Wales, and the Mines Department considers, therefore, that the State should not take full credit for the finished product. The real importance of the State as a producer of silver, lead, and zinc is thus to some extent lost sight of. The next table, however, which indicates the quantity of these metals locally produced, and the average contents by assay of concentrates exported during the last five years, will show, as regards New South Wales, the estimated total production and the value accruing to Australia from the three metals :—

SILVER-LEAD MINES.—NEW SOUTH WALES, TOTAL PRODUCTION, 1923 TO 1927.

Year.	Metal Produced within Australia.				Contents of Concentrates Exported.			
	Silver.	Lead.	Zinc.	Value.	Silver.	Lead.	Zinc.	Value.
	ozs. fine.	tons.	tons.	£	ozs. fine.	tons.	tons.	£
1923 ..	7,233,236	124,570	41,153	5,707,739	4,834,718	40,906	149,319	1,813,287
1924 ..	6,292,978	120,380	43,579	6,472,812	2,963,693	21,513	114,374	1,292,220
1925 ..	7,437,967	139,839	39,991	7,539,130	1,782,193	30,752	75,435	1,371,183
1926 ..	7,338,477	142,654	39,277	6,730,689	2,371,264	23,242	96,167	1,591,673
1927 ..	7,901,861	156,306	42,757	5,955,009	2,339,382	26,709	115,123	1,467,235

The figures given above are quoted on the authority of the Mines Department of New South Wales. Accurate details in regard to gold, copper, and antimony contained in the silver-lead ores are not available. Cadmium was first extracted in 1922 at Risdon, in Tasmania, and in 1927 the amount won was given as 135 tons, valued at £23,000. As pointed out previously, credit for this value is not taken in the New South Wales returns.

3. **Sources of Production.**—Broken Hill, in New South Wales, is the chief centre of silver production in Australia.

(i) *New South Wales.* (*a*) *Broken Hill.* A description of the silver-bearing area in this district is given in earlier issues of the Year Book. During 1913 the output of ore raised amounted to 1,744,000 tons, the highest recorded in the history of the field. For the four years 1915 to 1918 the production averaged over 1,200,000 tons, but, owing to the cessation of operations through industrial troubles and the fall in the price of metals, there was a decline in 1919 to 415,400 tons, and in 1920, when operations were carried on for a few weeks only, to 38,661 tons. Thenceforward there was a continuous increase, and in 1927 the tonnage raised amounted to 1,394,926, of which 1,384,440 tons consisted of sulphides, and 10,486 tons of oxidized ore. The major portion of the latter is sent for treatment to Port Pirie, in South Australia, while the remaining ore is concentrated on the field, and the silver-lead concentrates are forwarded to Port Pirie for smelting and refining. Portion of the zinc concentrates produced is treated at the Electrolytic Zinc Company's works at Risdon, in Tasmania, and the balance is sent overseas.

Although the returns are not complete in all cases, the following table relating to the companies controlling the principal mines at Broken Hill will give some idea of the richness of the field :—

SILVER.—BROKEN HILL RETURNS TO END OF 1927.

Mine.	Value of Output to end of 1927.	Dividends and Bonuses Paid to end of 1927.
	£	£
Broken Hill Proprietary Co. Ltd.	52,595,714	13,252,091
Broken Hill Proprietary Block 14 Co. Ltd.	4,660,753	670,160
British-Australian Broken Hill Co. Ltd	5,858,998	821,280
Broken Hill Proprietary Block 10 Co. Ltd.	4,946,989	1,432,500
Sulphide Corporation Ltd. (Central and Junction Mines)	25,014,607	3,129,375
Broken Hill South Ltd.	19,370,626	4,475,000
North Broken Hill Ltd.	14,045,496	4,353,940
Broken Hill Junction Lead Mining Co.	1,185,058	87,500
Junction North Broken Hill Mine	3,470,219	171,431
The Zinc Corporation Ltd.	7,147,426	2,728,701
Barrier South Ltd.	151,517	50,000
Totals	138,447,403	31,171,978

The returns relating to dividends and bonuses paid are exclusive of £1,744,000 representing the nominal value of shares in Block 14, British, and Block 10 companies, allotted to shareholders of Broken Hill Proprietary Company. If the output of the companies engaged in treating the tailings, etc., be taken into consideration, the totals for output and dividends shown in the table would be increased to about 146 millions and 34 millions respectively. The authorized capital of the various companies amounted to £6,823,000.

(*b*) *Picton Division.* The mines in the Yerranderie area produced 1,966 tons of ore in 1927, yielding 212,931 ozs. of silver, besides 316 ozs. of gold, and 530 tons of lead, the total production being valued at £28,202. Of the yield from this area in 1927, the production from the Silver Peaks mines was valued at £8,219.

(*c*) *Other Areas.* Small quantities of ore were raised during the year from the Cootamundra, Hillgrove, Kiandra, Leadville, Pambula, Tuena, and Yass divisions.

(ii) *Victoria.* The silver produced in 1927 amounted to 1,471 ozs., valued at £172, and was obtained in the refining of gold at the Melbourne Mint. In addition, 6 tons of silver lead ore, valued at £132, were obtained from a lease at Buchan.

(iii) *Queensland.* Owing to low prices, the yields from the chief silver and lead producing centres in 1927 showed a considerable decline, the total value of the production of both metals being only £32,000, as compared with £148,000 in 1926, and £241,000 in 1925. Some of the mining leases in the Chillagoe area are owned by the State. The Mount Isa silver-lead field in the Cloncurry district was discovered in 1923, and the lodes so far opened are distributed over a length of 5 miles by a width of one mile along the west bank of the West Leichhardt River. Large accumulations of high grade ores are in sight on this field, which, according to experts, is the largest find in importance since the discovery of Broken Hill. Experiments in concentration have proved highly successful as regards both carbonate and sulphide ores, and matters are now in train for the exploitation of the immense deposits available.

(iv) *South Australia.* Silver ore has been discovered at Miltalie and Poonana, in the Franklin Harbour district, also at Mount Malvern and Olivaster, near Rapid Bay, and in the vicinity of Blinman and Farina, at Baratta, and elsewhere. The production of silver in 1927 was valued at £20, and of silver-lead ore at £123.

(v) *Western Australia.* The quantity of silver obtained as a by-product and exported in 1927 was 49,895 ozs., valued at £5,829. In addition, 1,413 tons of lead and silver-lead ore and concentrates valued at £24,592 were exported. The production of lead ore from the Northampton mineral field amounted in 1927 to 5,800 tons.

(vi) *Tasmania.* The silver produced in 1927 amounted to 741,782 ozs., valued at £87,024, and the lead to 5,583 tons, valued at £135,403. About 641,000 ozs. of the total silver output were contained in silver lead, while 101,000 ozs. were contained in the blister copper produced by the Mount Lyell Co. The decrease in lead production as compared with 1926 was due to the closing of the Round Hill mine, and to a reduction in output from the North Farrell mine.

(vii) *Northern Territory.* Silver-lead ores are found near Pine Creek, and at Mount Shoebridge near Brock's Creek railway station. There are a number of fair-sized galena lodes in the Pine Creek and McArthur River districts, but, owing to costs of transport and realization little attention is devoted to them. The small production recorded in 1927 was obtained from deposits at Hidden Valley and near Kilgour Gorge, in the Borroloola district.

4. **World's Production.**—The world's production of silver during the last five years for which particulars are available is estimated to have been as follows :—

SILVER.—WORLD'S PRODUCTION, 1923 TO 1927.

Total.	1923.	1924.	1925.	1926.	1927.
World's production in 1,000 fine ozs.	240,169	238,780	241,697	251,279	254,639

The share of Australia in the world's silver production in 1919 was estimated at 7,800,000 ozs., or about 4½ per cent. of the total production, but in 1921, owing to the cessation of operations at the Broken Hill field, the total local extraction fell to 4,573,000 ozs., and the estimated silver contents of the ores, bullion, and concentrates exported to 732,000 ozs., the total being a little over 3 per cent. of the world's production. For 1927 local extraction was set down as 9,390,000 ozs., and exports as 2,256,000 ozs., the total being equivalent to a little over 4½ per cent. on production for the world. The figures for the world's production are given on the authority of *The American Bureau of Metal Statistics.*

Arranged in order of importance the estimated yields in 1927 from the chief silver producing countries were as follows :—

SILVER.—PRODUCTION, CHIEF COUNTRIES, 1927.

Country.	Production.	Country.	Production.
	Fine ozs. ('000 omitted.)		Fine ozs. ('000 omitted.)
Mexico	104,575	Japan	4,550
United States	59,412	Central America ..	3,000
South America	27,337	Dutch East Indies ..	2,400
Canada	22,613	Transvaal	1,012
Europe	(*a*) 11,811	Rhodesia	131
Australia	**11,646**	Algeria	100
British India	6,030	China	100

(*a*) Partly estimated.

5. **Prices.**—As the production of silver is dependent to a very large extent on the price realized, a statement of the average price per standard ounce in the London market during the last five years is given below :—

SILVER.—PRICES, 1923 TO 1927.

Price.	1923.	1924.	1925.	1926.	1927.
Pence per standard oz. ..	31.93	33.97	32.09	28.69	26.05

The average price in cents per fine ounce in New York fell from 69.07 in 1925 to 56.37 in 1927.

6. Employment in Silver Mining.—The number of persons employed in silver mining during each of the last five years is given below :—

SILVER MINING.—PERSONS EMPLOYED, 1923 TO 1927.

Year.	N.S.W. (a)	Q'land.	W. Aust.	Tasmania. (a)	Nor. Ter.	Australia.
	No.	No.	No.	No.	No.	No.
1923	5,155	133	(b) 96	510	..	5,894
1924	5,468	759	(b) 141	479	15	(c) 6,874
1925	5,770	590	(b) 204	579	4	(d) 7,166
1926	5,924	390	(b) 138	523	2	(e) 7,002
1927	5,833	277	(b) 51	718	..	(f) 6,882

(a) Silver, lead, and zinc. (b) Principally lead and silver-lead ore. (c) Including 12 in South Australia. (d) Including 19 in South Australia. (e) Including 25 in South Australia. (f) Including 2 in Victoria and 1 in South Australia.

The bulk of the employment up to 1924, when Queensland assumed importance, was in New South Wales and Tasmania, the quantity of silver raised in the other States being unimportant.

§ 5. Copper.

1. Production.—The production of copper in the various States has been influenced considerably by the ruling prices, which have undergone extraordinary fluctuations. The quantity and value of the local production as reported and credited to the mineral industry for the years 1923 to 1927 are shown in the following table :—

COPPER.—PRODUCTION, 1923 TO 1927.

State.		1923.	1924.	1925.	1926.	1927.
		QUANTITY.				
		Tons.	Tons.	Tons.	Tons.	Tons.
New South Wales	Ingot and Matte	1,182	1,129	478	357	186
	Ore	79	..	..	..	190
Queensland	Ingot and Matte	6,243	5,630	3,909	1,217	3,741
	Ore	..	..	..	..	..
South Australia	Ingot and Matte	3,523	405	570	232	202
	Ore	..	..	..	..	..
Western Australia	Ingot and Matte	1,057	..	..	1	..
	Ore	3,394	2,795	1,201	..	2
Tasmania	Ingot and Matte	6,065	6,698	6,539	6,915	5,811
	Ore	..	..	..	..	..
Northern Territory	Ingot and Matte	..	..	..	..	..
	Ore	..	(a) 32	(a) 4	(a) 7	..
		VALUE.				
		£	£	£	£	£
New South Wales		82,375	71,658	30,215	22,473	12,655
Queensland		430,746	380,025	254,074	73,591	218,842
South Australia		232,172	26,046	35,878	14,681	12,452
Western Australia		65,100	40,676	18,200	84	101
Tasmania		435,413	457,386	436,661	454,854	362,988
Northern Territory ..		(a) 30	(a) 239	(a) 15	(a) 60	..
Australia		1,245,836	976,030	775,043	565,743	607,038

(a) Year ended 30th June.

The total value of the production in 1920 was £2,658,000, and the heavy fall during recent years was due to the low price of the metal preventing the profitable working of many of the copper mines throughout Australia.

2. **Sources of Production.**—(i) *New South Wales.* The depression in this branch of the mining industry during the last few years is likely to continue, unless copper appreciates in value, and less costly methods of production are evolved. The Mt. Royal group at Tottenham raised 2,494 tons of ore valued at £4,116, and a small quantity was produced at the Kangiara mine in the Yass division. Prospecting operations were carried on at old leases in the Burraga area and about 40 tons of ore were produced. In addition to the 186 tons of (electrolytic) copper shown in the table, about 200 tons of ore were exported overseas.

(ii) *Queensland.* The yield in this State amounted in 1927 to 3,741 tons valued at £218,842, and shows a serious decline as compared with 1920 when nearly 16,000 tons valued at £1,552,000 were raised. The falling-off in the yield in recent years was due partly to the low prices realized for copper and partly to old-fashioned plant and methods of treatment. Returns from the chief producing areas in 1927 were as follows :— Cloncurry, 2,905 tons, £169,942 ; and Mount Morgan, 812 tons, £47,502. These yields naturally compare very unfavourably with those of 1920. From the Chillagoe area the return in 1927 was under 8 tons. The Mount Morgan Company decided to cease production in 1927 and the mine is now closed, although there are approximately 8 million tons of ore in its workings. Satisfactory exploitation of the deposits will, however, depend on improved methods of milling and smelting.

(iii) *South Australia.* Taking the entire period over which production extended, the yield of copper in South Australia easily outstrips that of any other State. In recent years, however, Queensland, Tasmania, and New South Wales have come to the front as copper producers, as the table on the preceding page shows. Deposits of copper ore are found over a large portion of South Australia. A short account of the discovery, etc., of some of the principal mining areas, such as Kapunda, Burra Burra, Wallaroo, and Moonta, was given in earlier issues of the Official Year Book. In 1927 the production amounted to 202 tons, valued at £12,452, as compared with 7,213 tons, valued at over £902,000 in 1917.

(iv) *Western Australia.* The value of the copper exported from this State in 1927 was only £101 as compared with £18,200 in 1925, the absence of production in 1927 being due to the low price ruling for the metal.

(v) *Tasmania.* The quantity of copper produced in Tasmania during 1927 was 5,811 tons, valued at £362,988, the whole of the production being due to the Mount Lyell Mining and Railway Co. Ltd. This Company treated 34,227 tons of ore and concentrates and produced 5,863 tons of blister copper, containing copper, 5,811 tons ; silver, 101,207 ozs. ; and gold, 2,138 ozs. ; the whole being valued at £383,809. The employees in 1927 numbered 1,012, of whom 494 were in the mining branch, 433 were engaged in the reduction works, and 85 in the railway department. Current for power and lighting is obtained from the Lake Margaret hydro-electric plant which also supplies the municipal requirements of Queenstown and Gormanston, and the Company's sub-station at Zeehan. Recognizing the fluctuating character of the returns from copper mining, and keeping in view the possibility of future exhaustion of the deposits, the directors wisely endeavoured to give permanence to the enterprise by investing portion of the profits in industrial undertakings, such as the manufacture of superphosphates and other chemical products. Success was early achieved, and this branch of the Company's business yields highly satisfactory returns. To the end of 1927 the Company had paid upwards of £4,587,000 in dividends.

(vi) *Northern Territory.* Copper has been found at various places, but lack of capital and difficulty of transport prevent the development of the deposits. In 1926, the production was returned at 7 tons of ore, valued at £60, obtained near Kilgour gorge in the Borroloola district, but none was recorded in 1927.

3. **Prices.**—The great variation in price that the metal has undergone is shown in the following table, which gives the average price in London and New York during each of the last five years. The figures are given on the authority of the *The American Bureau of Metal Statistics.*

COPPER.—PRICES, 1923 TO 1927.

Year.	Average London Price per Ton Standard Copper.	Average New York Price in Cents per lb. Electrolytic Copper.
	£	Cents.
1923	65.84	14.42
1924	63.15	13.02
1925	61.92	14.04
1926	57.97	13.80
1927	55.65	12.92

As evidence of the tremendous variation in the price of copper it may be noted that in December, 1916, the average London price of standard copper was £145.32 per ton, while in June, 1927, it was quoted at £54.03. In 1927 the highest average was £60.08, recorded in December.

4. **World's Production of Copper.**—The world's production of copper during the five years 1923 to 1927 is estimated to have been as follows. The figures for foreign countries have been taken from the latest issue of *The Year Book of the American Bureau of Metal Statistics* :—

COPPER.—WORLD'S PRODUCTION, 1923 TO 1927.

Year	1923.	1924.	1925.	1926.	1927.
World's production—tons	1,260,800	1,359,300	1,417,000	1,456,000	1,495,400

The yields from the chief copper-producing countries in 1927 were as follows :—

COPPER.—PRODUCTION, CHIEF COUNTRIES, 1927.

Country.	Production.	Country.	Production.
United States	757,100	Germany	28,000
Chile	235,900	Cuba	13,900
Africa	107,800	Jugo-Slavia	12,700
Canada	63,100	Russia	11,800
Japan	62,400	Norway	11,800
Mexico	56,900	**Australia**	**11,200**
Spain and Portugal ..	53,900	Bolivia	7,000
Peru	46,800	Austria	3,500

The Australian production in 1927 amounted to under 1 per cent. of the total.

During the year 1926 more than half the world's copper output was produced by the United States. A cartel known as Copper Exporters Incorporated formed there in that year controls about 90 per cent. of the world's production of the metal, and as the figures above show, the share of the United States in the world's total again exceeded 50 per cent. in 1927.

5. **Employment in Copper Mining.**—The number of persons employed in copper mining during each of the last five years was as follows :—

COPPER MINING.—PERSONS EMPLOYED, 1923 TO 1927.

Year.	N.S.W.	Q'land.	S. Aust.	W. Aust.	Tas.	Nor. Ter.	Australia.
	No.	No.	No.	No.	No.	No.	No.
1923	85	1,176	420	80	1,066	3	2,830
1924	52	1,017	34	110	532	12	1,757
1925	47	878	55	34	743	6	1,763
1926	31	270	26	8	697	..	1,032
1927	29	271	20	9	760	..	1,089

§ 6. Tin.

1. **Production.**—The development of tin mining is, of course, largely dependent on the price realized for the metal, and, as in the case of copper, the production has been subject to somewhat violent fluctuations. The tables below show the quantity and value of the production as reported to the Mines Departments in each of the States during the five years 1923 to 1927 :—

TIN.—PRODUCTION, 1923 TO 1927.

State.	1923.	1924.	1925.	1926.	1927.
	QUANTITY.				
	Tons.	Tons.	Tons.	Tons.	Tons.
New South Wales .. Ingots	896	1,041	957	1,134	976
New South Wales .. Ore ..	..	..	..	..	54
Victoria .. .. Ingots	..	..	..	..	..
Victoria .. .. Ore ..	78	38	69	29	62
Queensland .. .. Ingots	(a)	(a)	(a)	(a)	(a)
Queensland .. .. Ore ..	903	1,196	1,012	1,058	1,112
Western Australia .. Ingots	..	..	..	..	..
Western Australia .. Ore ..	131	87	108	67	77
Tasmania .. .. Ingots	1,160	1,108	1,130	1,096	1,106
Tasmania .. .. Ore ..	..	..	..	..	..
Northern Territory .. Ore ..	(b) 136	(b) 97	(b) 110	(b) 98	(b) 119
	VALUE.				
	£	£	£	£	£
New South Wales	180,789	259,485	250,944	326,474	287,539
Victoria	10,371	6,056	11,592	5,075	11,454
Queensland	114,945	175,509	161,500	174,147	193,774
Western Australia	15,095	12,008	15,392	10,450	13,316
Tasmania	236,955	275,014	297,515	322,526	317,593
Northern Territory	(b)13,887	(b)12,855	(b)15,966	(b)15,852	(b)18,754
Total	572,042	740,927	752,909	854,524	842,430

(a) Included with ore. (b) Year ending 30th June.

The rise in the price of tin during the period covered by the table is reflected in the increased value of production. In 1923, the average London price was £202 3s. per ton, while in 1926 it had advanced to £291 2s. per ton. There was a decline in the average for 1927 to £288 19s. per ton, although in March of that year the price was £313 6s.

2. **Sources of Production.**—(i) *New South Wales.* Tin-mining operations in 1927 were hampered by long continued spells of dry weather in the New England district, where the principal tin fields are situated. A large proportion of the output in New South Wales is obtained by dredging, the quantity so won in 1927 being 716 tons, valued at £143,850, as compared with 814 tons valued at £157,476 in 1926. Fifty dredges were in operation during the year. In the Tingha division of the Peel and Uralla district the yield amounted to 389 tons, valued at £76,386. The Emmaville division in the New England district showed a yield of 355 tons, valued at £70,628. In the Wilson's Downfall division, 66 tons, valued at £13,788, were raised. From the Torrington division, 202 tons, valued at £37,705, were returned. The Ardlethan field, in the Lachlan division, produced concentrates valued at £18,170, while Torrington returned 172 tons, valued at £32,300.

(ii) *Victoria.* The production in 1927 was obtained by dredging, the Cock's Pioneer Gold and Tin Co. in the Beechworth district contributing 44 tons valued at £7,920, while 14 tons were raised from a lease at Walwa, and 4 tons at Toora.

(iii) *Queensland.* The chief producing districts in Queensland during 1927 were Herberton, 499 tons, valued at £84,483; Kangaroo Hills, 258 tons, £45,516; Stanthorpe, 212 tons, £38,024; Cooktown, 54 tons, £10,165; and Chillagoe, 75 tons, £13,173. Despite the satisfactory prices realized in 1927, the total production valued at £194,000, was much below that of 1920, when the yield was valued at £252,000. Improved methods of production, coupled with more vigorous prospecting will, it is hoped, result in higher returns in future years. Considerable attention is being given to the alluvial deposits in North Queensland.

(iv) *Western Australia.* The export of tin from the State during 1927 amounted to 77 tons, valued at £13,316. The production from the Greenbushes field amounted to 58 tons of black tin, valued at £9,544, and from the Pilbara field 37 tons, valued at £6,229. Deposits of tin occur in widely-separated localities in the Kimberley division, the Thomas River in the Gascoyne Valley, and at Poona on the Murchison gold-field.

(v) *Tasmania.* During 1927 the output of tin amounted to 1,106 tons, valued at £317,593, the principal producers being the Briseis, Endurance, Pioneer, and Mt. Bischoff alluvial mines. The falling price of the metal was responsible for the lessened production as compared with the previous year. Deposits of low grade tin ore of large size are found in the granites of the Blue Tier, Weldborough, Avoca, and Heemskirk areas, and these will be drawn upon in the near future. At Fraser River, on King Island, alluvial tin ore in black sands (ilmenite) is found in considerable quantities, and efforts are being made to market the mixed product.

(vi) *Northern Territory.* The yield of tin concentrates in 1927 amounted to 119 tons, valued at £18,754, of which 61 tons were raised at Marranboy, 28 tons at Mt. Wells, and 6 tons at Hayes Creek, while small quantities were raised at Hidden Valley, Collia, and elsewhere. A small tonnage of concentrates was produced from alluvial tin, half of which came from the Pine Creek and Umbrawarra localities where it was obtained mainly by Chinese fossickers.

3. **World's Production.**—According to *The American Bureau of Metal Statistics* the world's production of tin during each of the last five years was as follows:—

TIN.—WORLD'S PRODUCTION, 1923 TO 1927.

1923.	1924.	1925.	1926.	1927.
Tons.	Tons.	Tons.	Tons.	Tons.
128,924	140,783	145,804	142,989	156,550

The yields from the chief producing countries in 1927 were as follows :—

TIN.—PRODUCTION, CHIEF COUNTRIES, 1927.

Country.	Production.	Country.	Production.
	Tons.		Tons.
Federated Malay States ..	52,200	**Australia**	**3,000**
Bolivia	35,700	Great Britain	2,400
Netherlands East Indies ..	35,300	Unfederated Malay States..	2,000
Nigeria	7,700	India	2,000
Siam	7,500	South Africa	1,700
China	4,000		

Based on the results for the last three years, Australia's share of the world's tin production would appear to be a little over 2 per cent.

4. **Prices.**—The average price of the metal in the London market for the years 1923 to 1927 was as follows :—

TIN.—PRICES, 1923 TO 1927.

Year.	Average Price per Ton.	Year.	Average Price per Ton.
	£ s. d.		£ s. d.
1923..	202 4 0	1926	291 0 4
1924..	248 14 9	1927	288 19 1
1925..	260 19 6		

The average price in 1922 was £159 9s. per ton and the subsequent increase is due to the fact that the growing demand for the metal for industrial uses has not been offset by the emergence of outstanding new sources of production. In 1927 the highest price was realized in March when the average stood at £313 6s. 4d., and the lowest in November with £262 11s. 10s. The price in December was given as £267 2s. 9d. per ton.

5. **Employment in Tin Mining.**—The number of persons employed in tin mining during the last five years is shown below :—

TIN MINING.—PERSONS EMPLOYED, 1923 TO 1927.

Year.	N.S.W.	Victoria.	Q'land.	W. Aust.	Tas.	Nor. Ter.	Australia.
	No.	No.	No.	No.	No.	No.	No.
1923	1,047	7	703	35	842	170	2,804
1924	1,004	2	698	40	781	115	2,640
1925	1,012	(*a*)	653	55	1,035	118	(*b*)2,875
1926	1,235	(*a*)	714	78	1,057	112	3,196
1927	1,430	42	906	106	1,230	95	3,809

(*a*) The tin produced in Victoria was raised by a dredging company operating primarily for gold.
(*b*) Including 2 in South Australia.

§ 7. Zinc.

1. **Production.**—(i) *New South Wales.* (*a*) *Values Assigned.* The production of zinciferous concentrates is chiefly confined to the Broken Hill district of New South Wales, where zincblende forms one of the chief constituents in the enormous deposits of sulphide ores. During the earlier years of mining activity on this field a considerable amount of zinc was left unrecovered in tailings, but from 1909 onwards improved methods of treatment resulted in the profitable extraction of the zinc contents of the accumulations at the various mines.

As the metallic contents of the bulk of the concentrates, etc., raised in the Broken Hill district are extracted outside New South Wales, the mineral industry of that State is not credited by the Mines Department with the value of the finished product. The figures given hereunder, therefore, refer to the quantity and value of the zinc concentrates actually exported during the years specified.

ZINC.—CONCENTRATES, ETC., EXPORTED FROM NEW SOUTH WALES, 1889 TO 1927.

Year.	Quantity of Zinc, Concentrates, etc., Exported.	Value.	Year.	Quantity of Zinc, Concentrates, etc., Exported.	Value.
	Tons.	£		Tons.	£
1889	97	988	1923	426,049	1,411,652
1891	219	2,622	1924	353,650	1,296,571
1899	49,879	49,207	1925	226,525	1,022,016
			1926	267,533	1,359,588
			1927	277,425	996,877

(*b*) *Local and Foreign Extraction.* A statement of the quantity of zinc extracted in Australia and the estimated zinc contents of concentrates exported overseas during the five years 1923 to 1927 will be found in § 18 hereinafter.

(ii) *Queensland.* The total production of zinc in 1926 was returned at 200 tons, valued at £6,827, produced from ores raised in the Chillagoe area, but there was no record of production in 1927.

(iii) *South Australia.* Zinc is known to exist in various localities in South Australia, but there has been no production during recent years.

(iv) *Tasmania.* Investigations in regard to the Read-Rosebery zinc-lead deposits in Tasmania have proved the existence of 1,680,000 tons of ore, which, added to an estimated quantity of 915,000 tons of " probable " ore, make a total supply of 2,595,000 tons. During the year 1927 the production from local ores was taken as 6,326 tons, valued at £181,242, the principal producer being the Hercules-Rosebery, worked by the Electrolytic Zinc Co.

The Electrolytic Zinc Co. at Risdon operated on raw materials obtained partly from the West Coast district of Tasmania, but chiefly from Broken Hill in New South Wales. Production from other than Tasmanian ores in 1927 consisted of 43,239 tons of zinc valued at £1,230,525, and 136 tons of cadmium, valued at £22,770. About 950 men were employed at these works.

2. **World's Production.**—According to the Year Book of the *American Bureau of Metal Statistics* the world's production of zinc during the five years 1923–27 was as follows :—

ZINC.—WORLD'S PRODUCTION, 1923 TO 1927.

1923.	1924.	1925.	1926.	1927.
Tons.	Tons.	Tons.	Tons.	Tons.
945,500	1,004,700	1,130,200	1,227,800	1,308,200

The yields from the chief producing countries in 1927 were as given hereunder.

ZINC.—PRODUCTION, CHIEF COUNTRIES, 1927.

Country.	Production.	Country.	Production.
	Tons.		Tons.
United States	547,800	Canada	65,700
Belgium	198,800	Great Britain	41,900
Australia	161,500	Netherlands	25,900
Upper Silesia	127,800	Poland (a)	20,200
Germany (a)	82,800	Japan	16,700
France	81,300	Spain	16,400

(a) Not including Upper Silesia.

The figures for Australia have been taken from returns supplied by the Australian Mines and Metals Association, and are considerably in excess of those shown in the American publication referred to above, which probably includes in the totals for some of the European countries a certain amount of zinc derived from imported Australian concentrates and ores.

3. **Prices.**—During the four years 1911 to 1914, the London price of zinc averaged £23 15s. per ton, ranging from £21 in 1914 to £26 3s. 4d. in 1912. Owing to the heavy demand and other circumstances arising out of the war, the prices in 1915 and 1916 reached the very high average of £67 11s. 1d. and £72 1s. 5d. per ton respectively. For 1921 the average recorded was £25 16s. 11d.; for 1923, £33 1s. 2d.; for 1924, £33 14s. 7d.; for 1925, £36 12s. 6d.; for 1926, £34 2s. 1d., while in 1927, the average fell to £28 10s. 3d. per ton.

§ 8. Iron.

1. **General.**—The fact that iron ore is widely distributed in Australia has long been known, and extensive deposits have been discovered from time to time at various places throughout the States, but the utilization of these deposits for the production of iron and steel is, at present, confined to New South Wales.

2. **Production.**—(i) *New South Wales.* (a) *Extent of Deposits.* Iron ores of various composition are found widely distributed throughout the State, but some of the deposits are at present of no commercial importance on account of their small and scattered extent, or by reason of their distance from means of transport. Excluding deposits too far from existing railways, or too small to warrant exploitation, as well as aluminous ores, the quantity of iron ore available by quarrying has been set down at 15 million tons. There is, in addition, a large tonnage available by the more costly method of mining. Altogether it appears probable that the total quantity available for smelting is about 53 million tons. The chief sources of supply during recent years were the deposits at Cadia, in the Orange division, and Tallawang, in the Gulgong division.

(b) *Lithgow Iron Works.* Reference to the events leading up to the establishment of ironworks at Lithgow will be found in earlier issues of the Year Book (see No. 3, p. 508). The iron ore was raised from quarries owned by the Company at Cadia, and the pig iron produced therefrom amounted to 118,951 tons, valued at £654,230. Operations were in progress in 1927 to test deposits in other areas held by the Company.

The following table shows the quantity and value of pig iron produced in New South Wales during the last five years from locally-raised ores only :—

PIG IRON.—PRODUCTION FROM LOCAL ORES, NEW SOUTH WALES, 1923 TO 1927.

Particulars.		1923.	1924.	1925.	1926.	1927.
Quantity ..	Tons	94,350	74,075	95,530	105,201	118,951
Value	£	707,625	518,525	525,415	578,605	654,230

The figures quoted above refer to production from *local* ores only, and as such credited to the New South Wales mineral industry. They do not, of course, represent the total production of pig iron in New South Wales, since, as shown in the succeeding paragraph, a considerable quantity of ore raised in South Australia, and credited therefore to the mineral returns of that State, is treated in New South Wales.

(c) *Newcastle Iron Works.* The Broken Hill Proprietary Company established works for the manufacture of iron and steel on a large scale at Newcastle, and operations were started early in 1915. The Company is utilizing the immense deposit of iron ore at the Iron Knob quarries in South Australia, which are connected with the seaboard at Whyalla, a distance of about 34 miles, by the Company's tramway. The ore quarried for the year ended 30th November, 1928, amounted to 550,458 tons. Extensive limestone works and loading bin at Devonport, Tasmania, as well as quarries in New South Wales for dolomite, magnesite, etc., are also owned by the Company.

The output of pig iron for the year ended 30th November, 1928, amounted to 289,326 tons, and of steel ingots to 333,587 tons. Further details in regard to the activities of these works in 1921 were given on page 347 of Official Year Book No. 15. The steel works possess three blast furnaces of a normal daily producing capacity of 1,300 tons, and a fourth furnace of 100 tons for the production of foundry iron. There are nine 65-ton basic open-hearth furnaces capable of producing 10 to 12,000 tons of ingot steel weekly. The works are supplied with a 35-inch blooming mill for the production of blooms, plates, etc., a 28-inch rolling mill for the manufacture of heavy rails, structural steel, billets, etc., an 18-inch mill for making light rails, structural shapes, fishplates, and heavy sections of merchant bars and billets, a 12-inch mill and an 8-inch mill, each for merchant bars, etc., a continuous rod mill for the production of wire rods, and a fishplate mill. A steel foundry, containing one acid open-hearth furnace, and one basic open hearth furnace, with a direct metal foundry which takes the hot metal from the blast furnaces, supply all necessary castings.

The company also possesses 224 by-product coke ovens, and connected with this department are the tar, sulphate of ammonia, and benzol plants.

(d) *Port Kembla Iron Works.* A Company with a nominal capital of £5,000,000 has been formed to establish iron and steel works at Port Kembla in the South Coast district. Complete and up-to-date plant has been acquired, and operations will be started at an early date.

(e) *Iron Oxide, etc.* A quantity of iron oxide is purchased by the various gasworks for use in purifying gas, and it is also to some extent employed as a pigment, and in paper manufacture, the output in New South Wales being drawn chiefly from the deposits in the Port Macquarie, Milton, Goulburn, and Newcastle Divisions. During 1927 the iron oxide raised amounted to 5,011 tons, valued at £3,116. Since the closing down of the Sulphide Corporation's Works at Cockle Creek in 1922 there has been no production of ironstone for fluxing purposes.

(ii) *Victoria.* Iron ore has been located at various places in Victoria, but without special assistance to the industry there does not seem to be any prospect of the deposits being profitably worked.

(iii) *Queensland.* Queensland possesses some extensive deposits of iron ore, which are mined chiefly for fluxing purposes in connexion with the reduction of gold and copper ores. During the year 1921, 4,061 tons of ironstone flux, valued at £5,976, were raised, the bulk of which came from Iron Island in the Rockhampton district. The production in subsequent years was small until 1926, when 4,412 tons, valued at £3,914 were raised from deposits in the Chillagoe area. About 500 tons were raised from this area in 1927. It is stated that Queensland possesses within its own borders an abundance of the ore, fuel, and fluxes required for the carrying on of a large ironworks.

(iv) *South Australia.* South Australia possesses some rich deposits of iron ore capable of being mined for an indefinite period. The best known deposit is the Iron Knob, a veritable hill of iron of high percentage, situated about 40 miles W.S.W. from Port Augusta. A recent survey places the probable reserves of ore in the Iron Knob and Iron Monarch deposits at 133 million tons, with an average content of 63.64 per cent. iron. The Broken Hill company utilizes ore from this quarry at its ironworks at Newcastle, New South Wales, and the amount raised for the year 1927 was 722,425 tons, valued at £830,789, the highest yet recorded. It is estimated that the deposits in the Middleback Range contain 32 million tons of slightly higher grade ore than that at the Iron Knob.

(v) *Western Australia.* This State has some very rich deposits of iron ore, but, owing to their geographical position, the most extensive fields at the present time are practically unexploited, the production in the State being confined chiefly to that needed for fluxing purposes. Allusion to the extent of these deposits will be found in previous Year Books. (See No. 20, page 747.) There is a possibility that the extensive deposits at Yampi Sound will be exploited at an early date with British capital.

(vi) *Tasmania.*—In Official Year Book No. 19, p. 742, some account was given of the position and magnitude of the deposits of iron ore in Tasmania, and it was pointed out that the quantity of ore available was estimated at 100 million tons. During the year 1908 about 3,600 tons of ore were raised, but there was no subsequent record of production. Exploitation of the deposits is at present dependent on the demand from the mainland.

(vii) *Northern Territory.* Large bodies of rich ironstone have been discovered in various parts of the Territory, particularly between the Adelaide River and Rum Jungle. Owing to the lack of local coal, however, the deposits possess no immediate value.

3. Iron and Steel Bounties.—The local production of iron and steel has been encouraged by various legislative enactments (see Official Year Book No. 15, p. 348). Under "The Iron and Steel Products Bounty Act 1922," bounties are payable on fencing wire, galvanized sheets, wire-netting, and traction engines made in Australia. It is essential that these articles be made from materials produced and manufactured in Australia, unless imported material is authorized after inquiry and report by the Tariff Board. The total payments in any one financial year must not exceed £250,000. Rates of bounty are—for fencing wire and galvanized sheets, £2 12s. per ton; for wire-netting, £3 8s. per ton; and for traction engines from £40 to £90 each, according to capacity. The amounts paid in each case during the year ended 30th June, 1928, were £104,485, £65,128, £73,873, and £140. Under the amending Act of 1927, the bounty on galvanized sheets was increased to £3 12s. per ton, and no bounty is payable on traction engines where the cost of materials or parts not produced in Australia amounts to more than 40 per cent. of the total cost.

4. World's Production of Iron and Steel.—The Australian production of iron and steel at present forms a very small proportion of the world's output. According to *The American Bureau of Metal Statistics*, the world's production of each commodity in the years specified for the principal countries was as follows :—

PIG IRON AND STEEL.—WORLD'S PRODUCTION, 1925 TO 1927.

Country.	Pig Iron.			Steel Ingots and Castings.		
	1925.	1926.	1927.	1925.	1926.	1927.
	Thousands of Tons.			Thousands of Tons.		
United States ..	36,370	39,101	36,350	45,394	48,294	44,214
Germany	10,014	9,489	12,850	12,000	12,145	15,975
France	8,358	9,281	9,150	7,327	8,295	8,100
Saar Territory ..	1,427	1,599	1,760	1,554	1,709	1,890
Belgium	2,501	3,345	3,685	2,508	3,320	3,645
Luxemburg	2,325	2,472	2,675	2,053	2,208	2,420
Austria	374	328	420	462	473	535
Italy	474	505	490	1,757	1,752	1,475
Spain	520	450	500	616	569	620
Czecho-Slovakia ..	1,147	1,071	1,230	1,476	1,319	1,625
Poland	310	322	575	797	777	1,245
Sweden	455	449	420	467	481	465
Russia	1,521	2,388	2,930	2,087	3,052	3,485
China	380	400	200	50	50	50
Japan	917	1,160	1,225	1,279	1,475	1,635
United Kingdom ..	6,262	2,442	7,350	7,385	3,560	9,200
India	880	900	1,060	449	520	555
Canada	596	776	825	756	777	900
Australia	**439**	**442**	**510**	**351**	**338**	**425**
Total—All Countries ..	75,670	77,450	84,790	89,202	91,559	98,904

The figures for Japan include Manchuria and Chosen.

§ 9. Other Metallic Minerals.

1. **Antimony.**—The production of star antimony in New South Wales amounted in 1927 to 63 tons, valued at £5,040, the output being obtained from ore raised principally at Hillgrove and Taylor's Arm. The total quantity of antimony (metal and ore) raised in New South Wales up to the end of 1927 was 19,209 tons, valued at £351,259. The production of antimony concentrates in Victoria during 1925 amounted to 120 tons, valued at £5,380. The whole of the production came from ore raised by a company operating at Costerfield, but none was recorded in 1926 and 1927. In Queensland extensive deposits were found at Neerdie in the Wide Bay district, at Wolfram Camp, on the Hodgkinson field, on the Palmer River in the Ravenswood district, and at various places in the Herberton district. Ore has also been obtained in the Dividing Range near Herberton and adjacent to some of the central tributaries of Emu Creek. Owing to the low price of the metal no production was recorded since the year 1919, except in 1926, when about 10 tons of ore valued at £105 were raised from deposits in the Clermont district. There was no production in 1927. In Western Australia lodes of stibnite carrying gold have been found in the Roeburne district. During 1917, 12 tons of antimony, valued at £258 were exported, but there was no subsequent production until 1920, when 3 tons, valued at £45, were exported, and 1926, when an export of 4 tons, valued at £85 was recorded. There was no export in 1927. Free antimony ore has not been found in great quantity in Tasmania, but associated with lead in the mineral jamesonite it is fairly common. Deposits of jamesonite are known at the Spray Mine, Zeehan; at Wallace Prospect, North-East Dundas; and at Ring Valley.

2. **Arsenic.**—In New South Wales the production of refined arsenic and concentrates in 1927 amounted to 151 tons, valued at £1,679, the chief sources of production being the Emmaville, Hillgrove, Moruya, and Torrington areas. During 1917 the high price

ruling for arsenic and the urgency for the need of supplies in connexion with the destruction of prickly pear, led to the reservation by the Queensland Mines Department of an extensive area of arsenic-bearing deposits at Jibbinbar, in the Stanthorpe district. Production in 1927 from the Stanthorpe district amounted to 70 tons of ore valued at £350. No arsenic was locally produced, the whole of the ore raised being sold for treatment outside the State. Owing to heavy transport charges competition is difficult with supplies from abroad. In South Australia arsenic-bearing minerals are found at some of the old mines, but, owing to slackness in the demand, only 100 tons of ore were raised in 1925, and none was raised subsequently. The arsenical ore (contained in gold ore) exported from Western Australia in 1927 was valued at £819.

3. **Bismuth.**—Ores of this metal are found in association with tungsten and molybdenum, and sometimes tin, in New South Wales, but owing to lack of a market the production of ore and concentrates in 1927 was only 1 ton valued at £204. The total production to the end of 1927 was 814 tons, valued at £233,481. In Queensland, wolfram and bismuth have been found in various districts, but, owing to the low prices obtainable, production in 1927 was small, amounting to about 6 tons, valued at £128, raised in the Chillagoe district. In South Australia deposits are found at Balhannah, at Mount Macdonald, and at Murninnie on the shores of Spencer's Gulf, A small quantity of bismuth was exported from Western Australia in 1919, but none was recorded subsequently. In Tasmania a small quantity, valued at £21, was raised in 1921 by the Shepherd and Murphy mine at Moina, but there was no production in recent years. A large body of bismuth ore has been located about three miles west of Moina and a syndicate has undertaken its development.

4. **Cadmium.**—The cadmium contained in the zinc ores mined at Broken Hill is recovered at Risdon, Tasmania, as a by-product in the electrolytic treatment of calcined zinc concentrates. During the year 1927, 135 tons, valued at £22,618 were so obtained, but, as pointed out previously, credit is not taken for the value of the finished product in the New South Wales returns as the metal is not recovered in the State. Tasmania in 1927 credited its mineral returns with 19 tons of cadmium, valued at £3,233, obtained by the Electrolytic Zinc Co. from zinc calcines produced from local ore.

5. **Chromium.**—There was no output of chromite in New South Wales during 1927 owing to lack of a market. A small quantity of ore was raised in the Barraba division but was left at grass. Chrome iron ore is found in Queensland in the Rockhampton district, and about 160 tons were raised in 1920 by the Mount Morgan Company at Glen Geddes, but there was no production in later years. Chromite has been discovered at Coobina on the overland route between Peak Hill and Nullagine in Western Australia, but, on account of the difficulties of transport and the low price of the mineral, there is no immediate likelihood of production.

6. **Cobalt.**—This metal was found at Carcoar in New South Wales in 1889, and subsequently at Bungonia, Port Macquarie, and various other places. There was no export of cobalt since 1911, and the total produced since 1860 amounted in value to only a little over £10,000. In Queensland a rich deposit was opened up in 1920 at Mount Cobalt in the Cloncurry area, and the production in 1926 amounted to 27 tons, valued at £5,430, but none was raised in 1927. Although the product is a valuable one, greater development is hindered by the uncertainty of the demand.

7. **Lead.**—Lead mining *per se* is not practised to any extent in Australia, the supply of the metal being chiefly obtained in conjunction with silver and zinc. In New South Wales the Mines Department took credit in 1922 for 8,113 tons, valued at £194,712, and the production to the end of 1922 was taken as 327,000 tons, valued at £6,442,000. Owing to the closing down of the treatment works at Cockle Creek in 1922 no subsequent production was recorded, the whole of the lead concentrates being forwarded for treatment outside the State, principally at Port Pirie in South Australia. As stated previously, the metallic contents of the major portion of the silver-lead ores are extracted outside New South Wales, and the figures quoted above refer only to lead values assigned as the produce of the State. In Victoria, oxides, sulphides, and carbonates of

lead are found in the reefs on most of the gold-fields. The deposits are not, however, of sufficient extent to repay the cost of working. In Queensland the deposits are worked chiefly for the silver, copper or gold contents of the ore, the lead produced in 1927 amounting to 914 tons, valued at £22,289. Of this total the Chillagoe area produced 401 tons, valued at £9,784; the Herberton area, 81 tons, valued at £1,976; Etheridge, 41 tons, £1,001; Cloncurry, 18 tons, valued at £451; Brisbane, 137 tons, valued at £3,343; and the Burketown area, 285 tons, valued at £5,734. Lead has been found at many places in South Australia, although with few exceptions, the lodes are not of great size. Production in 1927 was returned at 5 tons, valued at £123. During 1927, lead and silver-lead ore exported from Western Australia amounted to 1,413 tons, valued at £24,592. The bulk of the product consists of lead ore raised on the Northampton field. Mining, however, was restricted in consequence of the low price of lead. Tasmanian lead production in 1927 was returned as 5,583 tons, valued at £135,403. The decrease of about 310 tons on the yield for 1926 was due to the reduction of output from the North Farrell and cessation of operations at Round Hill. It is proposed to undertake an electro-magnetic survey of the Zeehan field, at one time a considerable producer.

8. **Manganese.**—During 1927 the output of manganese ore in New South Wales amounted to 1,202 tons, valued at £4,285, the metal being mined principally in the Deepwater, Grenfell, Tamworth, and Yass divisions. In Victoria the production in 1922 amounted to 150 tons, valued at £930, raised in the Heathcote division, but there was a break in production until 1927, when 15 tons were raised. In Queensland there are extensive deposits of low-grade manganese ores in various places. High-grade ore is not available in quantity, but the deposits of medium grade at Kandanga should in future become a valuable asset in the steel industry. Production in 1927 amounted to 242 tons, valued at £362, raised in the Gladstone area. Extensive deposits of the ore were mined at Boolcunda in South Australia some years ago, and it is found also at Pernatty, Hawker, and Gordon. The production in 1924 was valued at £1,128, but there was no output recorded subsequently. The Pernatty ore is of high grade, and being free from deleterious substances is specially suited for use in making high-grade steel. In Western Australia, ores of the metal are found widely scattered, the black oxide being especially plentiful in the Kimberley district. Extensive deposits exist in a locality 18 miles north-west from Peak Hill. In the northern part of the Cue district the deposits cannot at present be profitably worked owing to absence of cheap transport facilities. The export of manganese in 1927 consisted of 30 tons, valued at £303.

9. **Molybdenum.**—No production of molybdenite was recorded in New South Wales in 1927. The total production of the ore since its discovery is stated at 827 tons, valued at £211,800. In Victoria 42 tons of concentrates valued at £7,350 were produced in 1926 at Everton, but there was no record of production in 1927. The production in Queensland for 1925 was 3 tons, valued at £271, partly raised on the Chillagoe field, and partly at Mount Perry, but none was raised in 1926, and only about £200 worth in 1927. The Wombah mine near Mount Perry is regarded by geologists as one of the most promising sources of molybdenite in Australia. A small quantity was at one time produced from the mines in the Moonta district in South Australia, and the occurrence of the metal is reported from various other localities, but no production was recorded during recent years. Molybdenite occurs in small quantities at various localities in Western Australia, the production recorded in 1922 being valued at £500, but none was recorded in later years. In the Northern Territory, molybdenite is found at Yenberrie, where it is stated that the ore increases in richness as the workings become deeper.

10. **Radium.**—Deposits of radio-active ores occur in lode form in South Australia, and are believed to be richer and more extensive than any others so far located. There is an extensive deposit at Radium Hill, Olary, about 12 miles from Cutana railway siding, and another at Mount Painter in the Northern Flinders Ranges. Ores from both localities have yielded radium. Pure radium bromide was produced at a treatment plant in Sydney, and up to the end of 1914, when operations were suspended, 466 milligrammes were extracted. The Radium and Rare Earths Treatment Co. has been formed to exploit the radio-active ores at Olary, and a syndicate has taken up the workings at Mount Painter. A sample of 11 milligrammes of radium bromide was extracted from 2½ tons of crude ore in 1925 by experts attached to the first named

company. Extensive plant and buildings have been erected and it is hoped that production on a large scale will shortly be possible. The value of ore raised in 1925 was set down at £172, but none was recorded in 1926, and only about £1,000 worth in 1927.

11. **Tungsten.**—Wolfram and scheelite, the principal ores of tungsten, are both found in New South Wales, but the low prices obtainable caused a cessation of mining activity in this direction in recent years. Since 1920 there has been no production of scheelite, while the value of the wolfram produced was only £545. In Victoria the production of wolfram was returned in 1920 as 7½ tons, valued at £355, yields being obtained at Mount Murphy and the Tambo River, but there was no subsequent production. In Queensland tungsten ores are found in several districts, but owing to low prices, production in 1927 was insignificant, about 5½ tons of wolfram being obtained in the Chillagoe area. (See also "Bismuth.") A deposit of wolfram was discovered near Yankalilla, in South Australia, as far back as 1893, but no production has been recorded since the year 1917. The mineral is also found at Callawonga Creek. There was no production of tungsten minerals in 1927 in Western Australia. Tungsten ores are commonly met with in the gold reefs, and both wolfram and scheelite have been recorded as occurring in several widely-separated localities. Wolfram is mined at various points in Tasmania, the production for 1927 being 149 tons, valued at £9,886. The price of the mineral was too low to allow of the mines being operated for wolfram alone, and the output was obtained from material associated with tin ore. Scheelite has been discovered on King Island in Bass Strait, but there was no recent production. In the Northern Territory wolfram is found at Hatches Creek, Wauchope Creek, Wolfram Creek, Hidden Valley, and Yenberrie. Numerous samples of high grade ore have been obtained at the Frew River in Central Australia. The production in 1923 was, however, trifling, and none was recorded later.

12. **Other Metals.**—In addition to the metals enumerated above there is a large number of others occurring in greater or less degree, while fresh discoveries are being constantly reported.

§ 10. Coal.

1. **Production in each State.**—An account of the discovery of coal in each State will be found in preceding issues of the Year Book. (See No. 3, pp. 515–6.) The quantity and value of the production in each State and in Australia during the five years 1923 to 1927, are given in the table hereunder :—

COAL.—PRODUCTION, 1923 TO 1927.

Year.	N.S.W.	Victoria. (a)	Q'land.	S. Aust.	W. Aust.	Tasmania.	Australia.
			QUANTITY.				
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
1923 ..	10,478,513	476,823	1,060,662	..	420,714	80,718	12,517,430
1924 ..	11,618,216	518,315	1,123,117	..	421,864	75,988	13,757,500
1925 ..	11,396,199	534,246	1,177,173	..	437,461	81,698	13,626,777
1926 ..	10,885,766	591,001	1,221,059	..	474,819	102,358	13,275,003
1927 ..	11,126,114	684,245	1,099,040	..	501,505	112,056	13,522,960
			VALUE.				
	£	£	£	£	£	£	£
1923 ..	8,607,892	525,270	925,227	..	368,949	70,797	10,498,135
1924 ..	9,589,547	569,555	985,542	..	363,255	66,555	11,574,454
1925 ..	9,302,515	596,117	1,037,956	..	363,203	70,424	11,370,215
1926 ..	9,436,520	657,798	1,098,927	..	394,400	90,401	11,678,046
1927 ..	9,782,002	762,530	987,465	..	407,967	99,802	12,039,766

(a) Exclusive of brown coal.

The figures for Victoria quoted above are exclusive of brown coal, the quantity and value of which during the last five years were as follows :—

BROWN COAL.—PRODUCTION, VICTORIA, 1923 TO 1927.

Year.	Quantity.	Value.	Year.	Quantity.	Value.
	Tons.	£		Tons.	£
1923	116,888	38,019	1926	957,935	188,899
1924	127,490	41,116	1927	1,455,482	220,003
1925	876,468	166,404			

2. **Distribution and Production of Coal in each State.**—(i) *New South Wales.*—Estimates of the quantity of merchantable coal available in the deposits in each State were given in preceding issues of the Official Year Book (see No. 20, pp. 752 *et seq.*), but considerations of space preclude the repetition of the information in the present issue.

The coal from the various districts differs considerably in quality—that from the Northern district being especially suitable for gas-making and household purposes, while the product of the Southern (Illawarra) and Western (Lithgow) is an excellent steaming coal. At the present time the Greta coal seams are being extensively worked between West Maitland and Cessnock, and this stretch of country, covering a distance of 15 miles, is now the most important coal-mining district in Australasia. The Permo-Carboniferous measures have in various places been disturbed by intrusions of volcanic rocks, which in some instances have completely cindered the seams in close proximity to the intrusive masses, while in other instances the coal has been turned into a natural coke, portion of which some years ago realized good prices as fuel.

The table hereunder gives the yields in each of the three districts during the five years 1923 to 1927 :—

COAL.—PRODUCTION IN DISTRICTS, NEW SOUTH WALES, 1923 TO 1927.

District.	1923.	1924.	1925.	1926.	1927.
	Tons.	Tons.	Tons.	Tons.	Tons.
Northern	6,861,759	8,077,689	7,637,953	7,257,598	7,145,116
Southern	2,170,699	1,973,855	2,052,963	2,024,520	2,155,461
Western	1,446,055	1,566,672	1,705,283	1,603,648	1,825,537
Total ..	10,478,513	11,618,216	11,396,199	10,885,766	11,126,114

The output in 1927 has been exceeded on two occasions only, *i.e.*, in 1924 and 1925, but the value of the production in 1927, *i.e.*, £9,782,000, is the highest yet recorded.

(ii) *Victoria.* (*a*) *Black Coal.* The deposits of black coal in Victoria occur in the Jurassic system, the workable seams, of a thickness ranging from two feet three inches to six feet, being all in the Southern Gippsland district. An estimate by R. H. Cambage of the tonnage of extractable black coal places the total at 25 million tons, of which 20 millions are in the Wonthaggi area, 2 millions at Korumburra, Jumbunna, and Outtrim, and the balance in other small areas.

The output of black coal in Victoria during the last five years was as follows :—

BLACK COAL.—PRODUCTION, VICTORIA, 1923 TO 1927.

Year.	State Coal Mine.	Other Coal Mines.	Total Production.	Value.
	Tons.	Tons.	Tons.	£
1923	418,394	58,429	476,823	523,270
1924	452,032	66,283	518,315	569,555
1925	468,146	66,100	534,246	596,117
1926	531,869	59,132	591,001	657,798
1927	610,618	73,627	684,245	762,530

Amongst the other coal mines the chief producers in 1927 were the Sunbeam Colliery at Korumburra, with 22,429 tons; the South Gippsland Coal Mining Co. at Kilcunda, with 12,904 tons; and the Austral at Korumburra South, with 11,617 tons.

(*b*) *Brown Coal.*—(1) *General.* Deposits of brown coal and lignite of immense extent occur in gravels, sands, and clays of the Cainozoic period throughout Gippsland, Mornington Peninsula, Werribee Plains, Gellibrand, and Barwon and Moorabool basins. In the Latrobe Valley, the beds reach a thickness of over 800 feet. As estimated by boring, the total tonnage of brown coal available, according to a report by the Government Geologist, amounts to 10,378 million tons, of which 5,000 million tons are situated in the Morwell district, a similar quantity in the Traralgon district, 250 million tons at Welshpool-Gelliondale, while the Altona, Lal Lal, and Wensleydale areas are capable of supplying 100 millions, 25 millions, and 3 millions respectively. In 1917 an Advisory Committee appointed to report on the brown coal deposits of Victoria recommended the establishment of an open-cut mine at Morwell in connexion with a comprehensive scheme of electrical power generation and transmission, as well as for the supply of brown coal for other requirements. The recommendations of this Committee were incorporated in the "State Electricity Commission Act" of 1918. The Commission is actively engaged in the work of opening up the Morwell deposits, and the product is being utilized for the generation of electricity, which is transferred to Melbourne and to other towns in Victoria within economic distance. The first generator at the Yallourn power station was brought into operation on the 15th June, 1924, and the works are now assisting in meeting the increasing demands for electric energy in the metropolitan and country areas of Victoria, and in certain areas in the south of New South Wales. The energy sold during the year 1927–28 from the metropolitan terminal stations amounted to about 319 million kw.-hours. A township has been established at Yallourn, with provision for an ultimate population of 3,000. On the 30th June, 1928, there were 2,148 employees engaged on the various works of the Commission as follows:—At Yallourn, 1,345; Transmission Lines, 166; Metropolitan Works, 187; Water Power Investigation, 5; District Undertakings, 197; and Rubicon Hydro-Electric Scheme, 248. Overhead lines erected to the 30th June, 1928, amounted to 1,275 route miles, and length of cable to 4,218 miles. At the same date about 194 miles of underground cable had been laid.

The brown coal produced in Victoria was raised chiefly at the State Open Cut at Yallourn, where the output in 1927 amounted to 1,097,444 tons, while 356,170 tons were raised at the old open cut at Morwell. During the year, 1,818 tons were also raised by the Otway Coal Co., at Bambra, while small quantities were won by the Victorian Central Coal and Iron Co. at Lal Lal, and by the Australian Commonwealth Fuels and Oils Ltd. at Morwell.

(2) *Production of Briquettes.* The briquetting plant started operations in November, 1924, and the output for the year 1927–28 was 121,738 tons. It should be noted, however, that the original Yallourn plant is what is known as a "half factory," and economic production necessitates an extension thereof. Three additional briquette presses and a fifth boiler of 5,000 sq. feet heating surface were installed in 1927–28, and contracts have been let for considerable additions to the plant. The Yallourn briquettes are considered to be equal in quality to those produced in the best German factories.

The principal briquette-producing countries in 1927 were Germany with 40,768,000 tons; France, 3,842,000 tons; Belgium, 1,686,000 tons; Great Britain, 1,478,000 tons;

Spain, 813,000 tons; United States, 790,000 tons; Netherlands, 652,000 tons; and Poland, 249,000 tons.

(3) *Distillation Products.* A new industry is in contemplation for the distillation of oil, motor spirit, and other valuable substances from brown coal, experiments in this direction on a small scale having yielded very satisfactory results.

(iii) *Queensland.* The distribution of production during the last three years was as follows :—

COAL PRODUCTION.—QUEENSLAND, 1925 TO 1927.

Districts.	1925.	1926.	1927.
	Tons	Tons.	Tons.
Ipswich	614,053	649,184	612,888
Darling Downs	108,275	104,535	105,789
Wide Bay and Maryborough	119,704	109,519	96,345
Rockhampton (Central)	101,076	67,974	88,319
Clermont	62,204	77,947	49,437
Bowen	128,497	174,904	125,844
Mount Mulligan (Chillagoe)	43,364	36,852	20,063
Bundaberg	..	144	55
Mackay	..	..	300
Total	1,177,173	1,221,059	1,099,040

The output in 1927 was about 122,000 tons lower than that for 1926, which was the highest recorded. There were 41 collieries operating in the Ipswich district, 8 in the Darling Downs, 9 in the Maryborough area, 8 in the Central district, 1 at Mount Mulligan in the Chillagoe district, 1 in the Mackay district, and 2 in the Bowen district. State coal mines are in operation at Collinsville in the Bowen field, at Mount Mulligan in the Chillagoe field, and at Baralaba and Styx in the Central area.

(iv) *South Australia.* Thin seams of black coal similar to the Jurassic coal of Victoria have been proved by a bore at Robe, but the depth at which the seams were located, *i.e.*, between 2,830 feet and 3,950 feet, renders exploitation thereof unlikely. Reference to the situation and probable content of the widely distributed brown coal deposits in this State was made in Official Year Book No. 19, p. 750. In 1925, an expert commissioned by the Government to report on these deposits stated, amongst other things, that the brown coals at present known contain fairly large percentages of moisture, and have a high sulphur and ash content. Owing to their situation, deep-mining methods would be necessary to win the coal, at an estimated cost of 10s. per ton. An extensive system of " scout " boring was recommended, with a view to discovering deposits suitable for mining by open-cut methods.

(v) *Western Australia.* The production from the seven collieries situated at Collie amounted in 1927 to 501,505 tons. The output was about 27,000 tons in excess of that for the preceding year, and if the demand warranted it, the yield could be considerably increased. Coal supplied to the railways in 1927 amounted to 293,000 tons. The deposits at Wilga were not worked during the year.

(vi) *Tasmania.* The Cornwall, Mt. Nicholas and Jubilee Collieries on the East Coast were the chief contributors to an output in 1927 of 112,056 tons. It was hoped that supplies from the Catamaran Colliery, which produces an excellent steaming coal, would eventually render Tasmania independent of Newcastle, but the company suspended operations towards the end of the year after producing 18,000 tons, valued at over £23,000.

(vii) *Australia's Coal Reserves.* A summary of the information available in regard to estimated actual and possible reserves of coal for Australia as a whole was given in tabular form on p. 755 of Official Year Book No. 20, but considerations of space preclude its repetition in the present issue.

3. Production in Various Countries.—The total known coal production of the world in 1927 amounted to about 1,450 million tons, towards which Australia contributed nearly 15 million tons, or about 1 per cent. The following tables show the production of the chief British and foreign countries during each of the last three years where the returns are available. As the table shows, there was a fall of 117 million tons in the returns for Great Britain in 1926, the reduced output being due to the strike.

COAL PRODUCTION.—BRITISH EMPIRE, 1925 TO 1927.

Year.	Great Britain.	British India.	Canada.	Australia.	New Zealand.	Union of S. Africa.
BLACK COAL.						
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
1925	243,176,200	20,904,400	8,491,300	13,626,800	1,044,700	12,127,200
1926	126,278,500	21,009,200	11,502,500	13,275,000	1,196,400	12,745,500
1927	251,232,300	22,082,300	12,134,900	13,523,000	1,290,500	12,381,700
BROWN COAL, LIGNITE.						
1925	..	..	3,236,300	876,500	1,070,300	..
1926	..	..	3,210,100	957,900	1,044,000	..
1927	..	..	3,411,100	1,455,500	1,076,200	..

COAL PRODUCTION.—FOREIGN COUNTRIES, 1925 TO 1927.

Year.	Germany.	Austria.	Hungary.	Belgium.	France. (b)	Czecho-Slovakia.	Jugoslavia.
BLACK COAL.							
	Tons.	Tons.	Tons.	Tons	Tons.	Tons.	Tons.
1925 ..	130,527,500	142,900	776,900	22,732,300	46,353,500	12,360,600	175,600
1926 ..	143,001,000	154,800	813,800	24,860,700	50,581,400	13,953,100	187,800
1927 ..	151,173,500	172,700	771,600	27,130,400	50,960,800	13,794,900	283,200

Year.	Poland.	Nether-lands.	Russia.	Japan.	China.	United States.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
1925	28,622,000	6,740,400	14,746,900	30,962,600	21,000,000	519,526,700
1926	35,182,800	8,471,600	23,119,400	30,930,200	22,000,000	587,325,400
1927	37,482,600	9,175,900	32,258,600	32,258,600	18,000,000	533,802,600

BROWN COAL, LIGNITE.

Year.	Germany.	Austria.	Hungary.	Belgium.	France.	Czecho-Slovakia.	Jugoslavia.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
1925 ..	137,517,900	2,985,500	5,417,400	..	990,000	18,310,800	3,910,600
1926 ..	136,952,900	2,911,000	5,730,300	..	..	18,223,200	3,887,600
1927 ..	148,126,900	3,027,800	6,143,000	..	..	19,310,800	4,388,100

Year.	Poland.	Nether-lands.	Russia.	Japan.	China.	United States.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
1925	64,600	204,300	1,492,900	166,750	..	(a)
1926	74,800	207,900	2,256,800	158,600	..	(a)
1927	77,200	198,200	(a)	(a)	..	(a)

(a) Included with black coal. (b) Exclusive of Saar District, which produced 12,784,700 tons in 1925; 13,464,800 tons in 1926; and 13,391,100 tons in 1927.

4. Exports.—The exports of coal from Australia are chiefly confined to New South Wales.

The total quantity of coal of Australian production (exclusive of bunker coal) exported to other countries in 1927–28 was 556,000 tons, valued at £691,000, of which £681,000 worth were exported from New South Wales, and about £10,000 worth from Queensland.

In the following table will be found the quantity and value of the exports from New South Wales during the last five years. The figures are given on the authority of the Mines Department of that State, and include both bunker coal and coal exported from New South Wales to other States.

COAL.—EXPORTS, NEW SOUTH WALES, 1923 TO 1927.

Year	1923.	1924.	1925.	1926.	1927.
Quantity, 1,000 tons	4,900	5,414	4,771	4,538	4,339
Value, £1,000	5,481	6,037	5,243	5,229	5,364

Of the 4,339,000 tons of coal exported from New South Wales in 1927, about 82 per cent., or 3,556,000 tons, were shipped at Newcastle. The balance was sent away from the ports of Sydney, Port Kembla and Bellambi, and Catherine Hill Bay.

The principal countries to which coal was forwarded from Newcastle during the last three years were as follows :—

EXPORTS OF COAL FROM NEWCASTLE, NEW SOUTH WALES, 1925 TO 1927.

Country of Destination.	1925.	1926.	1927.
	Tons.	Tons.	Tons.
Victoria	1,502,000	1,389,000	1,271,000
New Zealand	616,000	495,000	400,000
South Australia	934,600	887,000	969,000
Tasmania	125,200	116,300	114,700
Western Australia	115,000	76,600	76,300
Queensland	101,300	103,600	48,700
United Kingdom	166,700	195,500	230,100
Java	98,800	102,800	71,400
Chile	4,600	13,200	800
United States	47,000	56,000	29,200
Philippine Islands	112,000	122,800	72,500
Argentine	..	91,100	..
India	34,900	34,800	30,100
Straits Settlements	37,100	22,900	23,900
Sandwich Islands	11,700	..	6,600
Fiji	48,300	36,700	35,700
Noumea	33,800	11,000	13,900
Peru	36,400	23,600	25,000
Japan	13,300	11,000	12,700
Ocean Island	20,900	20,700	13,700
Nauru	21,400	13,700	21,600
Canada	21,200	9,600	9,200
Germany	15,900	19,000	50,900
Total—All Countries ..	4,174,000	3,921,000	3,556,200

During the year 1927 the exports from Port Kembla and Bellambi to other States amounted to 134,000 tons, while 25,000 tons were sent to New Caledonia. The coal shipped from Sydney went principally to New Guinea and the Gilbert and British Solomon Islands. For the twelve months ended 30th June, 1927, about 31,000 tons of coal were dispatched to interstate ports from the jetty at Catherine Hill Bay, near Newcastle.

The distribution of the total output from New South Wales collieries during the last five years was as follows, the particulars given of quantity exported including coal shipped as bunker coal :—

COAL.—DISTRIBUTION OF OUTPUT, NEW SOUTH WALES, 1923 TO 1927.

Year.	Exports to Australian Ports.	Exports to Foreign Ports.	Local Consumption.	Total.
	Tons.	Tons.	Tons.	Tons.
1923	2,518,579	2,381,549	5,578,385	10,478,513
1924	3,096,881	2,317,063	6,204,272	11,618,216
1925	3,001,823	1,769,215	6,625,161	11,396,199
1926	2,740,570	1,797,257	6,347,939	10,885,766
1927	2,651,492	1,687,716	6,786,906	11,126,114

For the period of five years shown in the table above, 25 per cent. of the total output was exported to other States, 18 per cent. was sent overseas, and 57 per cent. was consumed locally. Since 1921 the home consumption has increased from 49 per cent. to 61 per cent. of the total output.

The figures quoted in the table above are given on the authority of the New South Wales Mines Department.

5. **Consumption in Australia.**—An estimate of the consumption of coal in Australia may be arrived at by adding the imports to the home production, and deducting the exports (including bunker coal taken by oversea vessels). The following table shows the consumption computed in the manner specified for the last five years :—

COAL.—CONSUMPTION, AUSTRALIA, 1923 TO 1927.

Year.	Quantity of Coal Consumed.		
	Home Produce.	Produce of Other Countries.	Total.
	Tons.	Tons.	Tons.
1923	10,022,228	62,660	10,084,888
1924	11,395,631	9,234	11,404,865
1925	12,536,179	9,137	12,545,316
1926	12,338,644	26,080	12,364,724
1927	13,378,301	23,563	13,401,864

The bunker coal taken away in 1927 was estimated at 991,000 tons. Figures for brown coal produced in Victoria are included in the total for home produce.

6. **Prices.**—(i) *New South Wales.* The price of New South Wales coal depends on the district from which it is obtained, the northern district coal always realizing a much higher rate than the southern or western product. The average price on the mine in each district and for the State as a whole during the last five years was as follows :—

COAL.—PRICES, NEW SOUTH WALES, 1923 TO 1927.

Year.	Northern District.	Southern District.	Western District.	Average for State.
	Per ton. s. d.	Per ton. s. d.	Per ton. s. d.	Per ton. s. d.
1923	17 7	16 1	11 5	16 5
1924	17 8	16 2	11 2	16 7
1925	17 7	15 11	11 1	16 4
1926	18 10	16 5	11 9	17 4
1927	19 2	16 8	12 6	17 7

(ii) *Victoria.* In Victoria the average price of coal in 1923 was 22s. ; in 1924, 21s. ; in 1925, 22s. 4d. ; in 1926, 22s. 3d. ; and in 1927, 22s. 3d. per ton. These averages are exclusive of brown coal, the production of which in 1927 was valued at 3s. per ton.

(iii) *Queensland.* Prices in the principal coal-producing districts during the last five years were as follows :—

COAL.—PRICES, QUEENSLAND, 1923 TO 1927.

District.	Value at Pit's Mouth.				
	1923.	1924.	1925.	1926.	1927.
	Per ton. s. d.	Per ton. s. d.	Per ton. s. d.	Per ton. s. d.	Per ton. s. d.
Ipswich	16 11	16 8	16 7	17 2	17 0
Darling Downs	19 1	18 10	18 8	19 2	19 6
Wide Bay and Maryborough	25 0	24 3	24 3	24 2	23 9
Bundaberg	..	..	..	24 7	23 8
Rockhampton	15 5	15 0	16 1	17 10	22 10
Clermont	12 10	11 0	12 0	13 6	13 11
Bowen (State Coal Mine) ..	16 0	16 5	16 0	16 2	16 3
Mount Mulligan (Chillagoe)	22 6	29 6	31 3	30 4	32 0
Average for State ..	17 5	17 8	17 8	18 0	18 0

The readjustment of prices and wages in the industry was responsible for the increases in the averages during the last four years.

(iv) *Western Australia.* The average price of the Collie (Western Australia) coal during the last five years was as follows :—In 1923, 17s. 6d.; in 1924, 17s. 3d.; in 1925, 16s. 7d.; in 1926, 16s. 7d.; and in 1927, 16s. 3d. per ton.

(v) *Tasmania.* The average price per ton of coal at the pit's mouth in Tasmania for the five years 1923 to 1927 was :—In 1923, 17s. 6d.; in 1924, 17s. 6d.; in 1925, 17s. 3d.; in 1926, 17s. 8d.; and in 1927, 17s. 10d. per ton.

7. **Prices in the United Kingdom.**—During the five years 1923 to 1927 the average selling value of coal at the pit's mouth in the United Kingdom was :—In 1923, 18s. 10d.; in 1924, 18s. 10d.; in 1925, 16s. 4d.; in 1926, 19s. 6d.; and in 1927, 14s. 7d. per ton.

8. **Employment and Accidents in Coal Mining.**—The number of persons employed in coal mining in each of the States during the year 1927 is shown below. The table also gives the number of persons killed and injured, with the proportion per 1,000 employed, while further columns are added showing the quantity of coal raised for each person killed and injured, this being a factor which must be reckoned with in any consideration of the degree of risk attending mining operations. A further table gives the rate of fatalities during the last five years.

According to the report of the Chief Inspector of Mines the average death-rate per 1,000 miners from accidents in coal mines in Great Britain during the quinquennium 1923–27 was 1.05, the rates varying between 1.09 in 1927, and 0.98 in 1923, while, as shown in the table following, the rate for Australia for the same period was 1.07. In the United States during the four years 1923–26 the death rate per 1,000 employees averaged 4.9 for bituminous coal miners, and 3.6 for anthracite miners. Rates for other coal-producing countries for the same period were—Canada, 2.6; South Africa, 3.6; Germany, 2.2; Spain, 1.7; Belgium, 1.0; France, 1.0 In comparing these rates, allowance must be made for the circumstance that the methods of calculation are not identical in all countries.

COAL MINING.—EMPLOYMENT AND ACCIDENTS, 1927.

State.	Persons Employed in Coal Mining.	No. of Persons.		Proportion per 1,000 Employed.		Tons of Coal raised for each Person.	
		Killed.	Injured.	Killed.	Injured.	Killed.	Injured.
New South Wales ..	24,494	24	107	0.98	4.37	463,600	104,000
Victoria	2,492	4	7	1.61	2.81	534,900	305,700
Queensland ..	2,842	3	115	1.06	4.05	366,300	95,600
Western Australia ..	748	1	99	1.34	132.35	501,500	50,700
Tasmania	360	..	4	..	11.11	..	28,000
Total ..	30,936	32	332	1.03	10.73	468,100	45,100

Owing to lack of uniformity in the definition of " injury," the figures relating to persons injured possess little comparative value.

The next table shows the average number of miners employed, number of fatalities, and rate per 1,000 during the quinquennium 1923–27 :—

COAL MINING.—FATALITIES, 1923 TO 1927.

State.	Average No. of Coal Miners.	Average No. of Fatal Accidents.	Rate per 1,000 Employed.
New South Wales	23,869	26.8	1.12
Victoria	2,489	2.8	1.12
Queensland	2,835	2.2	0.78
Western Australia	699	0.4	0.57
Tasmania	309	0.2	0.65
Total	30,201	32.4	1.07

For Queensland the rate for the quinquennium 1923–27 was 0.78, as against 17.6 for the five years 1921–5, when the figures were swollen by the inclusion in 1921 of the 75 deaths in the disaster at Mount Mulligan.

§ 11. Coke.

1. **Production.**—Notwithstanding the large deposits of excellent coal in Australia, there was, prior to the war, a fairly considerable amount of coke imported from abroad. During recent years, however, a high standard of excellence has been attained in the local product, and the necessity for import has to a large extent disappeared. During the year 1927–28 the coke imported amounted to 41,000 tons, of which 39,000 tons were obtained from the United Kingdom and 1,900 tons from Germany, the bulk of the product being taken by South Australia for use in the ore-treating works at Port Pirie. The table hereunder gives the production in New South Wales during the last five years :—

COKE.—PRODUCTION, NEW SOUTH WALES, 1923 TO 1927.

		1923.	1924.	1925.	1926.	1927.
Quantity ..	tons	580,374	564,372	609,418	597,663	709,342
Value, total ..	£	941,323	932,926	942,448	940,416	1,131,335
Value, per ton ..	..	32s. 5d.	33s. 1d.	30s. 11d.	31s. 6d.	31s. 10d.

The figures quoted refer to metallurgical coke, the product of coke ovens, and are exclusive of coke produced in the ordinary way at gas works. As regards both tonnage and value the production in 1927 is the highest recorded.

During recent years the industry has made considerable progress, and with the development of local iron and steel works, as well as metal refineries and smelting establishments, its future prospects ought to be assured.

A small quantity of coke is made in Queensland, the quantity returned in 1927 being 4,196 tons, valued at £5,608, A certain amount is obtained from outside sources, but the import in 1927 was small. The following table shows the amount manufactured locally during the last five years :—

COKE.—PRODUCTION, QUEENSLAND, 1923 TO 1927.

Year.		1923.	1924.	1925.	1926.	1927.
Quantity ..	tons	5,244	7,116	5,384	6,191	4,196

In order to avoid duplication with coal values the returns for coke have not been included in the general tables of mineral production in the early part of this chapter.

§ 12. Oil Shale and Mineral Oil.

1. **Production.**—(1) *New South Wales.* The production of kerosene shale amounted during 1924 to 642 tons, valued at £962, as compared with 32,489 tons, valued at £77,380 in 1921, but none was mined during the three years ending in 1927. It is estimated that the total quantity of shale in the State amounts to 40 million tons, but its profitable exploitation depends on economic methods of production. Up to date there has been no production of petroleum, but boring operations were carried out at the Loder dome and Belford dome sites in the Singleton division. The prospects of striking flow oil in the Belford dome and the associated structures known as the Loder and Sedgefield domes in the Hunter River district appeared encouraging, and the Federal Government offered to subsidize on a £1 for £1 basis approved boring operations in this area by the State or a private company. The Government Geologist of New South Wales has, however, expressed the opinion that " there is nothing in the nature of evidence to justify a belief in the existence of commercial supplies of oil or gas in the domes under consideration." This opinion is supported by the Geological Adviser to the Commonwealth Government, who recently visited the area. Boring was also carried on during 1927 at Ravensfield in the East Maitland division and in the parish of Dundoo in the Grafton division.

(ii) *Victoria.* Up to the present no extensive deposit of oil shale has been located in Victoria. Bores in search of oil have been put down from time to time, and small quantities of oil and gas have been recovered from rocks of the tertiary age near Lakes Entrance. Whilst deprecating anything in the nature of "blind stabbing," the Geological Adviser to the Commonwealth Government considers that the area offers a legitimate field for testing by approved scientific methods, and this is now being done.

(iii) *Queensland.* In 1927 the Roma Oil Corporation Ltd, which is vigorously prospecting for oil in the vicinity of Roma, produced petroliferous gas equal in quantity to that previously obtained, while a quantity of light oil was obtained direct from the bore. This bore, which reaches a depth of 3,706 feet, was put down close to the Roma Town bore and the old Government bore, from both of which at different times yields of gas had been obtained. A second bore passed through oil and gas horizons and encountered bed rock at approximately 4,000 feet. Many other companies are operating about Roma, and in the Longreach district. Indications are encouraging, but at the time of writing it is too early to express decided views as to the possibilities of commercial supplies becoming available. Permits to prospect in the district cover many hundreds of square miles. It may be noted that the lack of sufficient rock exposures in the Roma area renders the task of selecting satisfactory bore sites an extremely difficult one.

(iv) *South Australia.* A considerable amount of money has been spent by private companies and individuals in the search for oil, but the results so far have been negative. Unfortunately a good deal of boring has been done either without or against the advice of competent geologists. The South Australian Government offers a bonus of £5,000 to the person or company first producing 100,000 gals. of crude petroleum from a bore or well in the State.

(v) *Western Australia.* In this State the chief interest in the search for oil centres in the Kimberley division. At Mount Wynne, in West Kimberley, the gas which bubbles freely in a hot spring has been found to contain hydrocarbons. Indications of free petroleum have been obtained in bores on Price's Creek, about 100 miles south-east of Mount Wynne, and traces of mineral oil have been detected in a seepage. In East Kimberley a black bitumen, residual from an asphaltic oil, has been found in weathered basalt in two localities 5 miles apart, thus indicating the former circulation of petroleum in the area. Boring operations were in progress during 1927 at "Freney's" in the Fitzroy River area, on sites selected by an expert on behalf of the Federal Government, and very favourable indications have been met with. At times excitement has been aroused by the discovery in various localities of accumulations of coorongite, but the substance is not in any way connected with seepages of petroleum as it consists of a rubber-like aggregation of a microscopic single-celled alga on the surface of swamps.

(vi) *Tasmania.* The deposits of oil shale in Tasmania in the Latrobe-Railton-Kimberley, Oonah, Beulah, Quamby Bluff, and Nook areas have an estimated capacity of upward of 40 million tons. In addition, the recently discovered deposits at Cheshunt are known to be large, but their full extent has not been determined. During the last ten years exploitation of the vast areas available has been comparatively very small. For 1927 the output was 3,150 tons, valued at £2,050, the largest producer being the Australian Shale Oil Corporation at Latrobe. It is hoped that the problem of efficiently and economically retorting on a large scale will shortly be solved. A new discovery of shale was recently made near Chudleigh, in the Deloraine district.

(vii) *Northern Territory.* Considerable activity was displayed some years ago by speculators in acquiring areas under coal and oil prospecting licences along the north-western boundary of the Territory, and northerly along the western coast to the Daly River, but no developments were recorded, although what were regarded locally as good indications of oil were discovered. Many of the licences were forfeited, and, no success attended the boring operations at Elcho Island, although the prospects were considered satisfactory.

(viii) *Papua.* In 1911 indications of petroleum were reported near the Vailala River, and, acting on the reports of geologists, an oil expert was dispatched by the Commonwealth Government to sink trial bores on the site. Early in 1913 a small quantity of oil was obtained from a shallow bore. Later on, extensive geological surveys were made of the country between Yule Island and the Purari Delta, and oil was encountered in several trial bores. In 1919 the Anglo-Persian Oil Co., under

agreement with the British and Commonwealth Governments, and latterly with the Commonwealth Government only, has been engaged in work on the field. At the 30th June, 1927, there were nine mineral oil and coal licences embracing an area of 7,922 square miles. The Anglo-Persian Co. put down a fourth bore at Popo, and other Companies have sunk bores in the Gulf Division, in the Western Division, and near Cape Vogel on the north-east coast. A fifth bore at Popo met with difficulties, which have caused a temporary cessation of activity. Drilling by the New Guinea Oil Co. Ltd. at Hohoro was also interrupted by the difficulties met with.

(ix) *New Guinea.* At Matapau, about 54 miles frow Aitape on the north coast of what was formerly German New Guinea, oil has been struck in a shallow bore, and hopes are entertained that the product will be encountered in large volume at a greater depth. At 30th June, 1927, there were in force 8 licences to prospect for mineral oil and coal. Deep drilling up to the present has not been successful.

2. **Expert's Report.**—A report by Dr. Wade presented to the Senate in October, 1924, by the Minister for Home and Territories was generally unfavourable to the prospects of finding commercial supplies of petroleum in the northern portions of Western Australia and the Northern Territory. The report points out that the marginal areas on the Fitzroy apparently offered the best possibilities, and special mention was made of the Price's Creek region, although the structure there was not satisfactory in regard to present geological knowledge. It was recommended that the district should be tested with boring plant capable of penetrating to a depth of between 3,000 and 4,000 feet. Allusion was also made to the possibility of locating oil in the Belford dome area in New South Wales. In June, 1927, the Government appointed a geological adviser and later two palaeontologists to assist in technical matters relating to the search for oil.

3. **Exports.**—During the last five years the exports of kerosene shale have been trifling, only 11 tons being shipped from New South Wales in 1923–24, and 1 ton in 1924–25, while 1 ton was exported from Victoria in 1925–26. There were no exports in the last two years.

4. **Mineral Oil Bounties.**—The offer by the Commonwealth Government of a reward up to £50,000 for the discovery of oil in Australia was withdrawn in 1925, and sums amounting in the aggregate to £210,000 have been allocated for assistance in prosecuting the search for oil. Assistance has taken the form of (*a*) drilling for oil at Popo, Papua, by the Anglo-Persian Oil Co. as agents for the Commonwealth Government, (*b*) geological surveys in Papua and New Guinea by the A.P.O., (*c*) subsidies at the rate of £ for £ to companies drilling for oil in Australia and the Territories.

Under the Shale Oil Bounties Act an amount of £428 was paid during the year 1927–28 on crude shale oil produced in Australia from mined kerosene shale.

§ 13. Other Non-metallic Minerals.

1. **Alunite.**—The production of this mineral in New South Wales amounted during 1926 to 580 tons, valued at £2,320, raised in the Bullahdelah division. The mineral is sent to England for treatment, and, to the end of 1926, the exports were 58,200 tons, valued at £209,000. There was no production during 1927.

In Queensland about 3 tons of alunite were produced in 1927 from deposits in the Clermont area.

In South Australia a deposit of the mineral was located in 1913 at Carrickalinga Head, on the coast north of Normanville, and within a short distance of Adelaide. Fresh discoveries were later reported on the western shores of St. Vincent's Gulf. Systematic prospecting has proved the existence of a deposit of at least 41,000 tons near Stansbury, on the eastern coast of Yorke Peninsula. The mineral returns show a production of 95 tons in 1922, but none was recorded subsequently.

The exploitation of the alunite deposits in the North-East Coolgardie field in Western Australia has been retarded pending the result of field experiments to determine the suitability or otherwise of the product as a fertilizer in its unroasted state. Deposits of the mineral are also found in the Kalgoorlie area.

2. **Asbestos.**—This substance has been found in various parts of Australia, but up to the present has not been produced in any considerable quantity. In New South Wales the production in 1926 amounted to 4 tons, valued at £20, raised at Byng in the Orange division, but none was raised in 1927. In Queensland seams of asbestos have been found over a belt of country extending from Cawarral to Canoona, as well as in other districts. Samples of the fibre proved suitable for the manufacture of fibro-cement sheeting and tiles, but so far the deposits have not been commercially exploited. Deposits of asbestos have been located at previous places in South Australia. Production in 1924 amounted to 80 cwt., valued at £80, but none was raised subsequently. Chrysotile asbestos of high grade is found in various localities in Western Australia, particularly in the serpentine rocks between Nullagine and Roeburne, over a distance of 200 miles. The production in 1927 amounted to 11 tons, valued at £304, obtained in the Pilbara field. In 1918, 2,854 tons of asbestos, valued at £5,008, were produced in Tasmania. A small quantity was raised in 1919, but there was no production during recent years. Deposits of both chrysotile and amphibole asbestos occur at Anderson's Creek near Beaconsfield.

3. **Barytes.**—In New South Wales large quantities of this mineral are available at Kempfield in the Trunkey division, but the production in 1927 amounted to only 200 tons, valued at £400. Deposits are also found in the Candelo and Taralga divisions. The production in South Australia during 1927 was given as 1,886 tons, valued at £5,658. In this State there are extensive deposits at Noarlunga and Pernatty Lagoon. The mineral is also worked near Williamstown, while new sources of supply have been located near Eudunda. High grade natural white barytes is obtained from some of the workings, but a large amount of lower grade ore is discarded or wasted owing to lack of facilities for cleaning and bleaching. Barytes in fair-sized veins occurs at many places in Western Australia, especially at Cranbrook in the south-west division. The export in 1921 was, however, small, being valued at under £20, and none was recorded in later years. About 1,000 tons of barytes, valued at £4,000, were produced in Tasmania in 1920, the greater portion being won from deposits near Queenstown and Mt. Jukes, and the balance from Beulah and elsewhere, but there was no further production recorded until 1925, when a little over 3 tons, valued at £16, was raised, while none was raised in 1926 and 1927. It is stated that cost of transport is too high to allow of profitable production at present rates.

4. **Clays and Pigments.**—Valuable deposits of clays and pigments of various sorts are found throughout Australia. There is a considerable local production of earthenware. bricks, and tiles, but the finer clays have not as yet been extensively used. In New South Wales the production of pigments amounted in 1927 to 274 tons, valued at £507. The returns show that 226 tons of yellow ochre were raised at Delroy in the Dubbo division, and 29 tons of umber in the Gulgong division, while production was also reported from the Binalong, Mudgee, and Sydney divisions. About 11,300 tons of white clay, valued at £13,300, were raised from various areas during the year. The output of fireclay amounted to 34,494 tons, valued at £12,935, obtained chiefly in the Wollongong and Sydney divisions. In Victoria 2,473 tons of kaolin, valued at £3,334, were produced in 1927 from deposits at Stawell, Mt. Egerton, Heathcote, and Pyalong, and 65 tons of pigment clays, valued at £370, were raised from leases at Ballarat and Balnarring. Forty-nine tons of jarosite pigment, valued at £699, were raised at Port Addis. In Queensland, 335 tons of fireclay, valued at £184, were mined during 1926 in the Mount Morgan district, but none was recorded for 1927. Deposits of fine white clay have been located near Wondai and Kingaroy. In South Australia ochre is obtained at the Copper King pigment mine near Beltana, and is also raised near Oodnadatta. Production in 1927 amounted to 21 tons, valued at £288. Red oxide of suitable quality as well as ochres of various hues have been found in different and widely-separated localities in Western Australia. Investigation has proved the existence of a deposit of a fine white-ware clay about 4 miles from the railway at Wagin. Fireclay of good quality has been found at Clackline on the Eastern railway, about 50 miles from Perth. In 1927, 35 tons of pottery clay, valued at £114 were exported. Porcelain and other clays of good quality have been found in Tasmania at Beaconsfield, Sorell, Hagley, etc. Oil and water paints have been made from coloured ochres from Sorell, and deposits of ochre have been located near Mowbray and Beaconsfield. There was no record of production in 1927.

5. **Felspar.**—During 1927, the production of this mineral in New South Wales was 16 tons, valued at £20, raised at Brewongle. A fairly extensive deposit of felspar has been located at Black Ridge near Williamstown in South Australia, and the mineral has also been found near Myponga. Production in 1927 amounted to 92 tons, valued at £230. A large deposit of the mineral has been located near Jacob's Siding in Western Australia and it occurs also in the Coolgardie area. About 8 tons were exported in 1926, but none was recorded in 1927.

6. **Fluorspar.**—At Carboona in the Tumbarumba division in New South Wales this mineral is mined with silver and lead, the production in 1924 amounting to 470 tons, but none was raised subsequently. In Victoria 196 tons, valued at £625, were raised in 1921 by a company operating at Walwa, but none was recorded in later years. A high grade fluorspar occurs at the Perseverance mine on the Chillagoe railway in Queensland. Production in 1927 amounted to 1,033 tons, valued at £4,490. The output is, however, retarded by lack of a permanent market, low price, and increased mining costs at depth.

7. **Fuller's Earth.**—About 30 tons of this material, valued at £50, were produced in 1925 from deposits in the Mudgee division, New South Wales, but no output was recorded in later years. A large deposit of excellent quality has been located near Jennacubbine in Western Australia.

8. **Graphite.**—This mineral is widely distributed throughout Australia, but production in 1927 was small. In New South Wales, 10 tons, valued at £25, were raised in the Goulburn division. (See Official Year Book 19, p. 760.) In South Australia flake graphite has been found at various places on Eyre Peninsula. An extensive deposit has been located near Port Lincoln and a company has been formed to exploit the area. The Development and Migration Commission is investigating the possibility of the local use of the Uley deposit. At present the Australian market is supplied by imports chiefly from Ceylon.

9. **Gypsum.**—The output of gypsum in New South Wales during 1927 was 1,482 tons, valued at £2,038, raised chiefly in the Hay division. In Victoria during 1927 there was a production of 20,835 tons, valued at £11,388, of which 1,971 tons were raised from leases at Boort; 98 tons at Cowangie; 1,300 tons at Waitchie; 4,906 tons at Bolton; 709 tons at Murraydale; 7,467 tons at Tempy; and 4,384 tons at Chillingollah. South Australia possesses valuable deposits at Lake MacDonnell, and at Marion Bay and Cape Spencer in Yorke Peninsula. The production in 1927 amounted to 93,850 tons, valued at £82,119. A considerable quantity is used in the manufacture of plaster and cement, as well as for agricultural purposes. Gypsum is widely distributed in Western Australia in tertiary and late tertiary deposits associated chiefly with the salt lakes of the arid regions of the interior south of the tropics. Many of these lacustrine deposits are capable of yielding large tonnages. The production in 1927 amounted to 6,675 tons, valued at £9,818.

10. **Magnesite.**—Deposits of this mineral have been discovered at several localities in New South Wales. During 1927 the output was 10,017 tons, valued at £16,141, of which about 7,300 tons were raised at Attunga in the Tamworth division, 2,300 tons in the Fifield division, and 50 tons in the Cobar division. The mineral is found at Heathcote in Victoria, where 72 tons, valued at £237, were produced in 1927. There are deposits in the neighbourhood of Rockhampton and Bowen in Queensland, and in 1925 an output of 267 tons was recorded from the Rockhampton area, but there was no subsequent output. The deposits at present being worked in South Australia are situated at Paratoo, Robertstown, and Copley. Several other deposits have been located on Eyre Peninsula, near Port Pirie, and near Oladdie. Production in 1927 amounted to 330 tons, valued at £825. A large area of magnesite-bearing country has been located in Western Australia at Bulong, about 20 miles east of Kalgoorlie, and deposits have also been found at Coolgardie and other places. The mineral is of a high degree of purity, but there has been no production of importance since 1915.

11. **Mica.**—Mica is found at various places in Australia, and in 1925 a small quantity was raised at Wanda Vale in the Broken Hill division in New South Wales, and a little prospecting was carried out in the Narrabri division. There was no record of production in later years. Muscovite in fairly large quantities is found at Mica Creek, near Mount Isa

in Queensland. The production in 1925 amounted to 10 cwt., valued at £700, and the report thereon was so satisfactory that it was proposed to exploit the deposits on a large scale, but none was raised in 1926 and only 1 ton in 1927. A company was recently formed in London to exploit a deposit at Yinnietharra, about 240 miles from Carnarvon in Western Australia. In 1926 an export of 4 tons, valued at £8,328, was recorded, but it would appear that the value was overestimated. A similar quantity exported in 1927 was valued at £536. Several varieties of mica occur in Tasmania, and are widely distributed, but the flake is not sufficiently large to be of marketable value. The production of mica in the Northern Territory in 1925 was returned at 7,440 lb., valued at £2,835, obtained chiefly from the Hart's Range area, but there was no output during the last two years.

12. **Phosphate Rock.**—During 1927, 130 tons of phosphate, valued at £258, were obtained in New South Wales, of which 70 tons were won in the Molong division, and 60 tons in the Inverell division. In Victoria 120 tons, valued at £120, were raised in 1926 at Mansfield, but none was recorded in 1927. The production in Queensland amounted in 1922 to 65 tons valued at £279, raised by the Holbourne Island Phosphate Company in the Bowen district. Difficulty in finding a market for the product was responsible for the small output, and none was raised in recent years. South Australia possesses deposits scattered over a belt of country 200 miles in length, from Myponga in the south to the district round Carrieton, in the north. Production in 1927 amounted to 749 tons, valued at £1,124, obtained in the Light division of the Central area. It is stated that the industry is meeting with severe competition in the high grade phosphate imported from Nauru. In Western Australia the known phosphate deposits occur principally on the coastal islands, and in portion of the coastal plain between Dongarra and Perth. Some years ago guano digging on the islands was a large and profitable industry.

13. **Salt.**—Salt is obtained from salt lakes in the Western and North-Western districts of Victoria, and from salterns in the neighbourhood of Geelong. Figures regarding production are, however, not available for publication. Large quantities are obtained from the shallow salt lakes of South Australia, chiefly on Yorke Peninsula. Lake Hart, about 60 square miles in area, situated about 120 miles N.W. from Port Augusta, contains immense supplies of salt of good quality, and supplies are also obtained from Lake Bumbunga, north of the head of St. Vincent's Gulf. During recent years a fair amount has been produced by evaporation of sea water at the heads of Spencer's and St. Vincent's Gulfs. About 91,000 tons of crude salt, valued at £205,000, were produced during 1926, these figures being the largest yet recorded. The yield in 1927 amounted to 79,000 tons valued at £178,000. In Western Australia salt is obtained from depressions in the calcareous sandstones of the coast, which are filled to a shallow depth in winter with salt water. In summer the depressions dry up, leaving a layer of salt two or three inches thick, which is collected and refined. Up to the present, the four chief localities producing salt were Rottnest Island, off Fremantle; Middle Island, near Esperance; Yarra Yarra Lakes, near Three Springs; and Lynton, near Port Gregory. There is a very large number of salt and brine lakes which may ultimately be used as sources of salt. In the Northern Territory a small quantity of salt is produced from salt pans on Ludmillah Creek near Fannie Bay.

14. **Diatomaceous Earth.**—Although this mineral has been found at various localities in New South Wales, the deposits have not been worked commercially on any considerable scale. The output in 1927 was 1,210 tons, valued at £3,632, of which 810 tons were raised in the Coonabarabran division, and 400 tons in the Barraba division. Part of the product is used as a filtering medium in the manufacture of gelatine, and part for the manufacture of metal polish in powdered and liquid form. In Victoria there is a remarkably pure deposit at Lillicur, near Talbot, while beds of the mineral are also met with at other places in the Loddon Valley, near Ballarat, at various places close to Melbourne, at Cragieburn, Lancefield, Portland, Swan Hill, Bacchus Marsh, etc. During 1920, a production of 1,000 tons, valued at £5,000, was recorded, but no production was returned in later years. Fairly extensive deposits of diatomite exist in Queensland, in the Nerang, Beaudesert, and Canungar areas, but the various outcrops have as yet been only partly examined. In Tasmania a deposit of diatomaceous earth has been located at Oatlands, but its use for the manufacture of explosives is apparently prejudiced by the circumstance that the diatoms are pulverized and contaminated with clay.

§ 14. Gems and Gemstones.

1. **Diamonds.**—It is difficult to secure accurate returns in connexion with the production of precious stones, but the yield of diamonds in 1927 in New South Wales was estimated at 199 carats, valued at £227, while the total production to the end of 1927 is given at 202,431 carats, valued at £144,756. The yield in 1927 was obtained at Copeton in the Tingha division. Small quantities of diamonds are found in Victoria in the gravels of streams running through granite country in the Beechworth district, at Kongbool in the Western District, and near Benalla. The stones are generally small, and the production up to date has been trifling. In 1912, eleven small diamonds, valued at £20, were picked out of the sluice boxes of the Great Southern alluvial mine at Rutherglen. In Queensland a discovery was made in 1924 at Diamond Vale, about 2 miles east of Stanthorpe, the stones being found in alluvial tin wash. A flawless green diamond weighing 1 carat, a slightly smaller green, and a white weighting 1 carat, were recovered. The green diamond is extremely rare, and a specimen weighing 1½ carats, exhibited at Wembley Park, was valued at £1,750. In South Australia diamonds have been found on the Echunga gold-fields, the most notable gem being Glover's diamond, which was sold for £70. A few small diamonds have been found in the Pilbara district in Western Australia. Small diamonds have, from time to time, been found in Tasmania, chiefly while sluicing for gold in the Donaldson district.

2. **Sapphires.**—The production of sapphires in New South Wales during 1927 was returned as 3,118 ozs., valued at £2,612, obtained wholly at Sapphire and Nullamanna in the Inverell division. It is probable that the output is understated owing to the difficulty of obtaining accurate returns from individual miners and prospectors. A fair quantity of machine stones, zircon and corundum, was also raised, but values thereof are not included in the figures above. Production in 1927 was restricted owing to the poor market for the stones.

In Queensland during the early months of 1926 sapphires to the value of £6,799 were purchased by the Government under the gem pool scheme from miners on the Anakie field. Fancy stones occasionally bring high prices, an orange yellow which cut at 31 carats, valued at £300, being found in 1925. Amongst good stones found in 1926 were a golden-yellow, valued at £30, another at £60, and a blue weighing 3 ozs. 4 dwt. The latter was valued at £60, and was the largest blue sapphire found on the field for several years. There is a lapidary on the Anakie field, but many stones are sent away for cutting. Production in 1927 was valued at £2,000, the best stone being an orange yellow valued in the rough at £100.

Sapphires are plentifully found in the tin drifts of the Ringarooma and Portland districts in Tasmania, but the stones are, as a rule, small and not worth saving.

3. **Precious Opal.**—The estimated value of the opal won in New South Wales during the year 1927 was £13,353, of which gem to the value of £8,543 was obtained on the Lightning Ridge field, and £4,810 on the South Grawin field about 35 miles from Lightning Ridge. Some very fine stones are at times obtained, one weighing 5 ozs. and valued at £300 being recovered in 1911. Occasionally, black opals of very fine quality are found, one specimen from the Wallangulla field, weighing 6½ carats, being sold in 1910 for £102, while in the early part of 1920 a specimen realized £600. It is stated that this locality is the only place in the world where the "black" variety of the gem has been found. The total value of opal won in New South Wales since the year 1890 is estimated at £1,575,000, but it is a well known fact that fine pieces of the gem have been found and sold privately without notification to the Mines Department.

Small quantities of precious opal are found in the Beechworth district in Victoria.

The opaliferous district in Queensland stretches over a considerable area of the western interior of the State, from Kynuna and Opalton as far down as Cunnamulla. The yield in 1927 was estimated at £400, and up to the end of that year at about

£183,000. These figures are, however, merely approximations, as large quantities of opal, of which no record is obtained, are disposed of privately. At present the industry, which is not followed by practical miners, suffers from the peculiar disability that in good seasons there is plenty of work available on the pastoral stations, and most men prefer this to the uncertain results obtainable by fossicking, while in dry seasons, when constant work is not obtainable, the search for opal is blocked by the absence of grass and water on the fields.

At the Coober Pedy opal field situated in the Stuart Range in South Australia, the maximum number of miners engaged in 1927 was 90, the estimated value of the production being £9,000. The field is extremely prolific, a large quantity of precious white opal having been raised therefrom, while only a small portion of the known opal-bearing area has been thoroughly tested.

According to a report a few years ago by the Australian Trade Commissioner in the East there is a good sale for the gems in China. It is stated that there is no difficulty in cutting and polishing, as the Chinese method of dealing with jade, dating back many centuries, can also be applied to opal.

4. **Other Gems.**—Various other gems and precious stones have from time to time been discovered in the different States, the list including agates, amethysts, beryls, chiastolite, emeralds, garnets, olivines, moonstones, rubies, topazes, tourmalines, turquoises, and zircons. In Western Australia 200 carats of emeralds, valued at £421, were produced in the Cue district on the Murchison gold-field.

§ 15. Numbers Engaged, Wages Paid, and Accidents in Mining.

1. **Total Employment in Mining.**—The number of persons engaged in the mining industry in Australia fluctuates according to the season, the price of industrial metals, the state of the labour markets, and according to the permanence of new finds, and the development of the established mines. During the year 1927 the number so employed was as follows :—

NUMBER OF PERSONS ENGAGED IN MINING, 1927.

State.	Number of Persons engaged in Mining for—						Total.
	Gold.	Silver, Lead, and Zinc.	Copper.	Tin.	Coal.	Other.	
New South Wales ..	670	5,833	29	1,430	24,494	1,909	34,365
Victoria..	1,126	2	..	42	2,492	83	3,745
Queensland	304	277	271	906	2,842	314	4,914
South Australia	17	1	20	..	1	675	714
Western Australia ..	4,056	51	9	106	748	66	5,036
Tasmania	65	718	760	1,230	360	315	3,448
Northern Territory ..	12	..	..	95	..	53	160
Australia	6,250	6,882	1,089	3,809	30,937	3,415	52,382

Included in the figures for " other " in South Australia were 259 engaged in mining for iron, 152 gypsum miners, 149 salt gatherers, and 70 opal miners. The Tasmanian figures include 120 osmiridium miners, and those for the Northern Territory 50 mica miners.

The following table shows the number of persons engaged in mining in Australia during each of the years 1891, 1901, and 1927, together with the proportion of the total population so engaged :—

NUMBER ENGAGED IN MINING PER 100,000 OF POPULATION, 1891, 1901, AND 1927.

State.	1891.		1901.		1927.	
	Miners employed.	No. per 100,000 of Population.	Miners employed.	No. per 100,000 of Population.	Miners employed.	No. per 100,000 of Population.
New South Wales	30,604	2,700	36,615	2,685	34,365	1,444
Victoria	24,649	2,151	28,670	2,381	3,745	217
Queensland	11,627	2,934	13,352	2,664	4,914	551
South Australia	2,683	834	7,007	1,931	714	125
Western Australia	1,269	2,496	20,895	11,087	5,036	1,308
Tasmania	3,988	2,695	6,923	4,017	3,448	1,642
Northern Territory ..	..	..	..	..	160	3,779
Australia	74,820	2,341	113,462	2,992	52,382	849

The general falling-off since 1901 is largely due to the causes mentioned in §1.6 *ante*.

2. **Wages Paid in Mining.**—Information regarding rates of wages paid in the mining industry, which in earlier issues of the Year Book was given in this chapter, is now contained in the Labour Report issued by this Bureau.

3. **Accidents in Mining, 1927.**—The following table gives particulars of the number of men killed and injured in mining accidents during the year 1927 :—

MINING ACCIDENTS, 1927.

Mining for—	N.S.W.	Victoria.	Q'land.	S. Aust.	W. Aust.	Tas.	N.T.	Australia.
KILLED.								
Coal ..	24	4	3	..	1	..	..	32
Copper ..	..	..	..	..	..	..	..	..
Gold ..	..	1	..	..	15	..	..	16
Silver, lead, and zinc ..	3	..	..	..	..	..	..	3
Tin	2	..	..	..	..	2	..	4
Other minerals	..	..	..	..	..	2	..	2
Total ..	29	5	3	..	16	4	..	57
INJURED.								
Coal ..	107	7	115	..	99	4	..	332
Copper ..	2	..	5	..	..	15	..	22
Gold ..	1	1	2	..	270	..	..	274
Silver, lead, and zinc ..	31	..	1	..	1	23	..	56
Tin	2	..	5	..	..	8	..	15
Other minerals	..	..	..	14	..	9	..	23
Total ..	143	8	128	14	370	59	..	722

The number killed in mining accidents in 1927 was considerably less than that for 1921 when 132 deaths were recorded, the figures for the earlier year being swollen by the 75 fatalities in the colliery disaster at Mount Mulligan in Queensland.

§ 16. Government Aid to Mining.

1. **Commonwealth.**—Assistance to mining is given by the Commonwealth under the provisions of the *Precious Metals Prospecting Act* 1926, and the Petroleum Prospecting Acts of 1926, 1927, and of 1928.

The first-mentioned Act provides for a sum of £40,000, of which £15,000 is to be expended in the Northern Territory, and the balance is to be allocated to the States in such proportions as the Minister determines.

Under the *Petroleum Prospecting Act* 1926–1927 a trust account of £160,000 was established to assist in the search for oil. The Minister was authorized to make advances out of the money standing to the credit of this account to persons or companies engaged in the search for oil, and to assist persons, companies, or State Governments to make geological surveys. The Petroleum Prospecting Act of 1928 provides a further sum of £50,000.

To provide for geophysical prospecting in Australia, a sum of £32,000 has been made available by the Commonwealth Government in conjunction with the Empire Marketing Board.

2. **New South Wales.**—The chief aid given in this State is in the direction of assistance to prospectors. Up to the end of 1927 the total sum expended in this manner amounted to £587,172, of which £12,804 was advanced in 1927. A sum of £1,000 was made available during the year for the purpose of assisting in the erection of crushing batteries or reduction plants, and advances were made therefrom to the amount of £750. The reward for the discovery of new mineral fields within the State has been increased from £500 to £1,000, with provision for sums of £250 and £500 in respect of fields not large enough to qualify for the full amount, and the conditions have been made more liberal. During the year a sum of £250 was paid in connexion with the discovery of the Grawin opal field. A sum of £5,000 has been made available by the Commonwealth Government under the provisions of the Precious Metals Prospecting Act to assist in the search for precious metals in the event of the prospecting vote becoming exhausted within the financial year.

3. **Victoria.**—During the year 1927 expenditure in connexion with mining development amounted to £28,792, of which £3,548 represented advances to miners, £4,658 aid to mining companies, while £14,525 was expended on boring, £485 on covering abandoned shafts, £2,492 on testing plants, and £3,084 on geological surveys.

4. **Queensland.**—State assistance to the mining industry in 1927–28 amounted to £28,490, of which £402 consisted of loans in aid of deep sinking, £6,586 grants in aid of prospecting, and £197 in aid of roads and bridges to gold and mineral fields and water supply. In addition, a sum of £21,305 was expended in loans under the Act of 1906, £8,022 on State Coal Mines, £935 in aid of mining, and £12,348 on State Smelting Works.

During the year the Chillagoe State Smelters worked intermittently, and produced 500 tons of lead bullion containing 109 ozs. of gold, 33,657 ozs. of silver, and 489 tons of lead, in addition to 40 tons of blister copper containing 10 ozs. gold, 5,738 ozs. silver, and 39 tons copper. Four State batteries were in operation during 1927 as follows, the works at Irvinebank producing 178 tons of tin concentrates; 614 ozs. of gold were extracted by the battery at Kidston, which was not fully occupied owing to insufficient ore supplies and shortage of water; at Charters Towers parcels of ore were treated for miners and prospectors; and at Bamford tin crushing was carried on intermittently for a return of 14¾ tons of black tin. The State Assay Office at Cloncurry, in addition to free assays, dealt with 818 parcels of samples aggregating 9,792 tons.

5. **South Australia.**—Aid is given to the mining industry under the terms of the Mining Act of 1893, and previous measures. Up to the end of 1927 the total amount of subsidy paid was £68,338, of which £13,438 has been repaid, and £4,549 written off, leaving a debit of £50,351. Portion of this amount is represented by machinery that has fallen into the hands of the Government. Repayments must be provided from profits, but in only two instances have the profits enabled a full return to be made. During the year 1927 assays and pan tests numbering 300 were made by State batteries and cyanide works of small parcels of ore or tailings received from prospectors. Thirty-four parcels of ore weighing 511 tons were treated for a return of 477 ozs. gold valued at £1,500.

6. **Western Australia.**—Under the Mining Development Act of 1902 assistance was granted in 1927 in accordance with the subjoined statement:—Advances in aid of mining work and equipment of mines with machinery, £19,391; aid to prospectors, £5,089; water supply, £45,990; boring, £8,777; subsidies for cartage, £5,035; rebates to prospectors, £750; other, £6,654; total, £81,686. The industry has been further assisted by Government guarantees to banks on behalf of various companies, and at the end of 1927 the liability in this respect amounted to £51,500.

In 1927 there were 29 State batteries in operation. The amount expended thereon up to the end of 1927 was £91,981 from revenue and £319,348 from loan, giving a total of £411,329. During the year receipts amounted to £21,496, and working expenditure to £29,957. The total value of gold and tin recovered to the end of 1927 at the State plants was £6,121,194, resulting from the treatment of 1,458,042 tons of gold ore and 80,935 tons of tin ore, together with a small amount from residues. Free assays and determinations of mineral values for prospectors are made at the Kalgoorlie School of Mines.

7. **Tasmania.**—In the Aid to Mining area at Zeehan the expenditure in 1927 amounted to £1,721, of which £1,677 represented assistance and sustenance to prospectors. The amount received from ore sales was £588, of which £541 was paid to tributers. Receipts amounted to £1,095, included in which was a sum of £500 received from the Commonwealth Government.

Tributers' assays are made at a nominal charge, and all tribute surveys are carried out free of charge by the Assay and Survey Office at Zeehan.

8. **Northern Territory.**—During the year 1927–28 a sum of £171 was expended on State aid to mining, £74 being granted to prospectors for gold, and £97 to prospectors for tin.

The Government maintains a battery at Marranboy, and the Government Assayer makes free assays for prospectors, and arranges for the sampling, storage, and sale of ores.

§ 17. Commonwealth Government Control of Industrial Metals.

The proclamation under the Customs Act prohibiting the exportation of metals without the consent of the Minister for Trade and Customs was revoked on the 13th October, 1927.

§ 18. Metallic Contents of Ores, etc., Produced and Exported.

1. **Local Production.**—According to returns compiled from various sources by the Australian Mines and Metals Association the quantities of the principal metals (exclusive of gold) extracted in Australia during the five years 1923 to 1927 were as follows :—

REFINED METALS PRODUCED IN AUSTRALIA, 1923 TO 1927.

Metal.		1923.	1924.	1925.	1926.	1927.
Silver	ozs.	7,645,689	7,631,213	8,573,506	8,946,218	9,390,070
Lead, pig ..	tons	118,513	126,625	146,129	150,460	164,480
Zinc	tons	41,153	46,372	45,698	47,356	49,155
Copper	tons	17,825	14,100	10,984	11,148	9,564
Tin	tons	3,053	3,167	3,171	3,188	2,989

The local production of pig iron during the last five years ranged between 330,000 tons in 1923, and 439,000 tons in 1926.

2. **Metallic Contents of Ores, Concentrates, etc., Exported.**—The estimated metallic contents of ores, concentrates, etc., exported during the five years 1923 to 1927 are given in the following table :—

METALLIC CONTENTS OF ORES, CONCENTRATES, ETC., EXPORTED, 1923 TO 1927.

Metal.		Contained in—	1923.	1924.	1925.	1926.	1927.
Silver	ozs.	Lead—Silver—Gold Bullion	283,453	158,361	189,223	..	..
		Lead Concentrates and Ores	1,298,750	90,360	850,552	190,647	615,484
		Zinc Concentrates and Ores	3,526,774	1,941,507	1,270,166	1,206,313	1,640,891
		Copper Ores	1,378	51,942	..	..	..
		Total	5,110,355	2,242,170	2,309,941	1,396,960	2,256,375
Lead	tons	Lead—Silver—Gold Bullion	3,564	1,808	2,751	2,483	488
		Lead Concentrates and Ores	18,572	4,852	19,651	7,174	4,891
		Zinc Concentrates and Ores	425	19,859	12,423	13,943	14,198
		Total	22,561	26,519	34,825	23,600	19,577
Zinc	tons	Lead Concentrates and Ores	..	384	366	529	579
		Zinc Concentrates and Ores	146,693	122,305	79,996	94,043	111,755
		Total	146,693	122,689	80,362	94,572	112,334
Copper	tons	Ores, Matte, etc. ..	2,182	875	864	1,112	1,597
Tin	tons	Concentrates and Ores ..	..	4	..	1	12

§ 19. Oversea Exports of Ores, Metals, etc.

The following table shows the quantity and value of the principal oversea exports of ores, concentrates, and metals, the produce of Australia, together with the countries to which the respective products were forwarded, for the year 1927–28 :—

OVERSEA EXPORTS OF AUSTRALIAN ORES, METALS, ETC., 1927–28.

Article.	Total Exports.	Exports to—						
		United Kingdom.	United States.	Belgium.	Germany.	Japan.	New Zealand.	Other Countries.
QUANTITY.								
Ores—	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.
Alunite	19,200	19,200	..	..	..	..	..	..
Silver and Silver-lead	94,766	..	..	61,620	33,146	..	..	..
Iron	202,280	..	202,280	..	..	..	..	..
Concentrates—								
Silver and Silver-lead	316,733	..	99	260,636	55,998	..	..	..
Zinc	6,101,581	3,751,160	..	1,715,138	196,845	..	..	(*a*) 438,438
Cadmium—Blocks, Ingots, etc.	4,231	3,041	..	320	320	370	..	(*b*) 180
Copper—								
Matte	99,291	..	..	99,183	108	..	..	..
Ingot	47,157	32,670	..	14,017	169	..	47	(*c*) 254
Tin—Ingot	30,235	10,741	14,740	..	..	..	4,735	19
Lead—								
Matte	75,005	75,005	..	..	..	..	..	..
Pig	3,201,395	2,248,220	..	573,939	235,063	78,272	29,618	(*d*) 36,283
Zinc—Bars, Blocks, etc.	840,832	234,227	..	92,014	212,058	289,123	..	13,410
	oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.
Platinum, Osmium, etc.	1,068	686	342	..	40	..	..	..
Gold—								
Matte	254	254	..	..	..	..	..	..
Bar, Dust, etc.	154,341	1,010	139,006	..	91	..	..	(*e*) 14,234
Silver—								
Matte	65,933	65,933	..	..	..	..	..	..
Bar, Ingot, etc.	7,455,322	8,113	..	..	11,206	..	2,140	(*f*)7,433,863
VALUE—£.								
Ores—								
Alunite	3,840	3,840	..	..	..	..	..	..
Silver and Silver-lead	75,900	..	..	57,563	18,337	..	..	..
Iron	5,344	..	5,344	..	..	..	..	..
Concentrates—								
Silver and Silver-lead	208,463	..	195	170,203	38,065	..	..	..
Zinc	1,473,660	868,388	..	427,707	72,599	..	..	104,966
Cadmium—Blocks, Ingots, etc.	45,860	32,942	..	3,548	3,290	4,258	..	1,822
Copper—								
Matte	107,628	..	..	107,498	130	..	..	..
Ingot	157,930	109,339	..	47,474	330	..	187	600
Tin—Ingot	389,388	135,882	191,127	..	..	..	62,131	248
Lead—								
Matte	46,713	46,713	..	..	..	..	..	..
Pig	3,469,523	2,435,117	..	605,515	268,101	85,228	35,792	39,770
Zinc—Bars, Blocks, etc.	1,231,752	338,084	..	130,300	314,832	429,460	..	19,076
Platinum, Osmium, etc.	21,723	14,800	6,093	..	830	..	..	..
Gold—								
Matte	1,091	1,091	..	..	..	..	..	..
Bar, Dust, etc.	605,861	4,081	541,257	..	364	..	..	60,159
Silver—								
Matte	7,716	..	..	..	..	..	..	..
Bar, Ingot, etc.	880,550	937	..	..	1,401	..	291	877,921

(*a*) France. (*b*) France, 60 cwt.; Sweden, 120 cwt. (*c*) Canada. (*d*) Hong Kong, 22,974 cwt.; South Africa, 10,958 cwt.; Philippines, 2,309 cwt. (*e*) India. (*f*) Ceylon, 10,638 oz.; India, 7,416,823 oz.; Fiji, 6,402 oz.